XVIII.—*Notes on the Meteorology of Ireland, deduced from the Observations made in the Year* 1851, *under the Direction of the Royal Irish Academy. By the* Rev. HUMPHREY LLOYD, *D.D., F.R.S.; Hon. F.R.S.E.; V.P.R.I.A.; Corresponding Member of the Royal Society of Sciences at Gottingen; Honorary Member of the American Philosophical Society, of the Batavian Society of Sciences, and of the Societè de Physique et d'Histoire Naturelle of Geneva, &c. &c.*

Read June 27 and December 12, 1853.

THE science of meteorology is, perhaps more than any other, dependent upon *co-operation* and upon *method.* Individual observers may investigate successfully certain detached meteorological problems, such as the laws of the diurnal and annual changes of temperature, pressure, and humidity, at a given place; but little progress can be made in Climatology, or in the knowledge of the greater movements of the atmosphere, and their relation to the non-periodic variations of temperature and pressure, without the co-operation of many observers distributed over a large area, and acting upon a common plan.

For this task the voluntary association of individuals is insufficient. However zealous such persons may be, it is not possible to bind them to that uniformity of system without which little can be effectively done. Observations taken at different hours, or by different methods, can never be compared satisfactorily; and *any* comparison will involve an amount of labour in the processes of reduction which may render them impracticable. In addition to this, certain rules of observation are imposed by the conditions of some of the great problems of meteorology; and no co-operation in which these rules are deviated from can contribute to their solution.

For these and other reasons it is desirable that, in every country, such observations should be provided for by the Government, and placed under the direction of one of its official departments. And there can be no doubt of the services which meteorology, properly studied, may be made to contribute to those interests which it is the duty of every Government to promote. The health of man, the operations of agriculture by which he procures his food, and many other of his material interests, are dependent upon climatological relations, which must be known and studied before they can be applied. Every one acknowledges the fact, that the salubrity of a district, and its adaptation (or the reverse) to particular human constitutions, is intimately connected with its meteorological conditions. And the same thing is true of all organized beings, and especially of those which are subservient to the uses of man. Thus, the question of the naturalization of exotic plants is, mainly, a meteorological problem, dependent upon the climatological relations of the region to which the plant is indigenous, and of that to which it is to be transferred; and the importance of obtaining accurate data for its solution will be recognised, when it is borne in mind that, in Europe, most of the plants useful to man belong to this class, and that those hitherto acclimatized probably bear a very small proportion to the whole. Lastly, the processes of cultivation, to which these vegetables are to be subjected, are also connected in an intimate manner with meteorological knowledge. We may instance this connexion in the operations of irrigation, and of drainage, both of which are dependent upon the knowledge of the amount of rain-fall in the district to be operated on.

It is true that meteorological science has been hitherto comparatively barren in such applications; and the fact itself, with many persons, would be accepted as evidence that abstract and practical knowledge are wholly separate and unconnected. But, when properly understood, it leads to a different conclusion. *Superficial* knowledge in this science can indeed yield but few practical results; and those by whom such results have been hitherto sought have expected to find them at the surface. There are indeed cases—such, for example, as the one last referred to—in which the connexion between meteorological science and its applications is obvious and simple, and in which, accordingly, that connexion has been traced and made use of. But in general it is otherwise. In a subject so complex as the laws which govern the aerial envelope

of the earth, and where so many causes are in operation, practical applications can be obtained only from *mature* theoretical knowledge. Thus, it may be shown that the knowledge of the phenomena of temperature, requisite for the determination of the possible geographical limits of a single species of plants, is by no means inconsiderable;* and when to this we add the consideration of the other agencies which are at work in the atmosphere, all influencing vegetable life, it is plain that we are not in a condition to deduce any useful result connected with the distribution of species, until we have mastered a much larger amount of theoretical knowledge than is usually brought to bear in such deductions.

It would seem, therefore, to be the duty of the Government of every civilized state to provide the statistical data which have so many important bearings upon the material welfare of the people, and in the form best fitted for their discussion and examination. And to the lover of truth itself, for its own sake, the fulfilment of this duty would, fortunately, supply the wants of science in the most complete and satisfactory manner.

In many countries, accordingly, provision has been made by their respective Governments for the collection and discussion of meteorological data upon a uniform and well-digested plan. The Government of Prussia appears to have taken the lead in this important labour. Its example has been followed by those of Russia, Austria, Bavaria, and Belgium; and the names of DOVE, KUPFFER, KREIL, LAMONT, and QUETELET, to whom the superintendence of these observations has been intrusted, afford the surest warrant of their successful prosecution.† But perhaps the most important undertaking of this nature is

* For each plant there is a lower limit of temperature, below which it will cease to vegetate; while, in order that it may blossom and bear fruit, it must receive, between the two seasons of this minimum temperature, a certain amount of heat beyond this limit which is constant for each species. It is upon this *integral of effective heat*, as has been shown by DE CANDOLLE, that the existence of the species depends. For information on this and other subjects connected with the applications of meteorology, see the interesting introduction, by M. MARTINS, to the *Annuaire Meteorologique de la France.*

† The results of many of these series have been already published. Professor DOVE has published the results of the observations made in Prussia in the years 1848 and 1849. The observations made at the Russian observatories have been published from time to time by M. KUPFFER, in the *Recueil des Observations faites dans l'Empire de Russie.* The results of the Bavarian obser-

the recent organization of a system of meteorological observations *at sea* by the Government of the United States. There are, at the present time, nearly 1000 masters of ships, belonging to the navy and merchant services of the United States, engaged in such observations; and the discussion of the results, by Lieutenant MAURY, has led to many consequences of great value to the sciences of meteorology and hydrography, and rich in practical applications to navigation. The Government of the United States has earnestly sought the co-operation of the Governments of the several maritime nations of Europe in this enterprise, and the demand has led to a Conference at Brussels, for devising a uniform system of meteorological observations at sea. This Conference, held in August and September last, was attended by individuals representing the respective Governments of Belgium, Denmark, France, Great Britain, Netherlands, Norway, Portugal, Russia, Sweden, and the United States.

Impressed with the conviction that it was the duty of each country to take its part in these labours, and especially in the investigation of its own climatology, the Council of the Royal Irish Academy directed their attention, early in the year 1850, to the object of organizing a uniform system of meteorological observations in Ireland. And the peculiarity of the climate of this island perhaps more than balances the smallness of its extent, in giving an interest to the investigation. Situated as it is at the north-western extremity of Europe, and exposed to the full influence of the northern branch of the gulf stream which sweeps its western shores, its winter temperature is as high as that of the southern shores of the Euxine; while, on the other hand, the great precipitation of vapour, due to the same cause, gives it a summer heat as low as parts of Finland.

The questions, whose solution was aimed at by this measure, are thus stated by the Council in their second Report:—

1. The distribution of temperature, humidity, and rain, as affected by geographical position and by local circumstances; and the other phenomena of climate.

2. The effect of season (combined with the influences already referred to)

vations have been given by Dr. LAMONT, in the *Annalen der Meteorologie;* and those of the Belgian system, in the admirable series of papers drawn up by M. QUETELET, *Sur le Climat de Belgique.*

upon the distribution of temperature, and the varying position of the isothermal lines *from month to month.*

3. The *non-periodic* variations of pressure, temperature, and humidity, and their connexion with the course and direction of the aerial currents.

4. The phenomena and laws of storms, whether revolving or otherwise.

5. The periodical winds prevailing during certain seasons, and their modifications from geographical position or local causes.

6. The course and rate of progress of atmospheric waves.

Concurrently with the meteorological observations, it was determined to institute an extended series of observations on the phenomena and laws of the tides around the coasts of Ireland, the results of which will shortly be laid before the Academy by Mr. HAUGHTON. The observations of the former class having been intrusted by the Council to my care, for reduction and discussion, I now proceed to lay before the Academy their principal results. It will be necessary, however, in the first instance to describe the plan of observation itself.

*Stations.*—The meteorological stations are:—

1. The Coast-guard stations at Portrush, Buncrana, Donaghadee, Courtown, Dunmore East, Castletownsend, Cahirciveen, and Kilrush; and, for observations of sea temperature only, those of Cushendall and Bunown. At all of these the observations were taken, with the permission of the Lords of the Treasury and of the Comptroller-General, by the boatmen belonging to the Coast-guard Service, the individuals having been specially selected for the duty by the inspecting officers, and having been instructed in the mode of observing by members of the Council of the Academy.

2. The Lighthouses at Killough, Inishgort, and Killybegs, where, with permission of the Ballast Board, the observations were made by the lightkeepers, instructed as before.

3. The Astronomical Observatories of Armagh and Markree, where the observations were taken by the Observatory assistants, with the permission of Dr. ROBINSON and Mr. COOPER; the Magnetical Observatory of Dublin, where they were made with the permission of the Board of Trinity College; and the stations at Portarlington and Athy, where they were undertaken by Dr. HANLON and ALFRED HAUGHTON, Esq.

In addition to these the Academy has received observations, made upon the prescribed plan, from the Royal Observatory of Dublin, and from the Queen's Colleges at Belfast and Galway, which could not conveniently be included in the following discussions, not having extended over the whole of the period discussed. The observations at the Royal Observatory, and at the Queen's College, Belfast, commenced in April, 1851, and have been continued to the present time; the necessity for their omission is the more to be regretted, as they appear to have been made with every possible care.

The positions of the several stations, together with the heights (in feet) of the cisterns of the barometers above the mean sea level,* are given in the annexed Table. They are shown in Plate VII.

TABLE I. NAMES AND POSITIONS OF THE METEOROLOGICAL STATIONS.

| No. | Station. | County. | Latitude. | Longitude. | Height above Sea. | Locality. |
|---|---|---|---|---|---|---|
| I. | Portrush, . . . . | Antrim, . . . . | 55°13′ | 6°41′ | 29 | Coast-guard station. |
| II. | Buncrana, . . . | Donegal, . . . . | 55 8 | 7 27 | 48 | Do. |
| III. | Donaghadee, . . | Down, . . . . . | 54 38 | 5 33 | 16 | Do. |
| IV. | Killybegs, . . . | Donegal, . . . . | 54 34 | 8 27 | 20 | Lighthouse. |
| V. | Armagh, . . . . | Armagh, . . . . | 54 21 | 6 39 | 211 | Observatory. |
| VI. | Killough, . . . . | Down, . . . . . | 54 13 | 5 40 | 23 | Lighthouse. |
| VII. | Markree, . . . . | Sligo, . . . . . | 54 14 | 8 28 | 132 | Observatory. |
| VIII. | Westport, . . . . | Mayo, . . . . . | 53 50 | 9 37 | 17 | Lighthouse. |
| IX. | Dublin, . . . . . | Dublin, . . . . | 53 21 | 6 15 | 19 | Magnetical Observatory. |
| X. | Portarlington, . | King's County, | 53 9 | 7 12 | 230 | Dr. Hanlon's residence. |
| XI. | Athy, . . . . . | Kildare, . . . . | 53 0 | 6 58 | 200 | Mr. Haughton's residence. |
| XII. | Courtown, . . . | Wexford, . . . | 52 39 | 6 13 | 34 | Coast-guard station. |
| XIII. | Kilrush, . . . . | Clare, . . . . . | 52 38 | 9 30 | 19 | Do. |
| XIV. | Dunmore, . . . | Waterford, . . | 52 8 | 6 59 | 66 | Do. |
| XV. | Cahirciveen, . . | Kerry, . . . . . | 51 56 | 10 13 | 52 | Do. |
| XVI. | Castletownsend, | Cork, . . . . . | 51 33 | 9 9 | 18 | Do. |

The instruments were furnished by the Academy to the coast-guard and lighthouse stations; and were constructed under the direction of the Council, and upon a common plan. They consist of a barometer, a pair of ordinary thermometers (dry and wet bulb), a pair of self-registering thermometers, a

* At Portarlington and Athy these heights have been taken from the Contour Maps of the Ordnance Survey, and must, therefore, be considered as only approximate: at all the other places they have been obtained by actual levelling from the nearest Ordnance bench-marks.

wind-vane, Lind's anemometer, a rain-gauge, and (at the coast-guard stations) a thermometer adapted to the observation of sea temperature. The thermometers were previously compared in Dublin with the standards belonging to the Magnetical Observatory, and their errors exactly determined. The barometers were compared with the Dublin standard after they were placed at the several stations, by means of good portable barometers; and the heights of the cisterns above the sea were ascertained by levelling. All this was done by Members of the Council, under whose superintendence the instruments were erected.

The following were the positions of the instruments:—

PORTRUSH.—The barometer was put up in the guard-house, which is situated on an eminence facing the harbour; and the thermometers and the rain-gauge in a small attached garden. The four thermometers at this, and at every other station, were inclosed in a shallow box with a sloping roof, and wire-gauze front. A vertical gnomon was fixed at most of the stations in the window-sill of the guard-house, for the purpose of determining the time of noon; and the observers were furnished with a Table of the equation of time computed for the year 1851, and for the mean longitude of Ireland.

DONAGHADEE.—The meteorological instruments were favourably placed: the barometer in the guard-house, and the thermometers and rain-gauge in an inclosed yard connected with it. The meridian line was traced on the sill of a window in the guard-house, the shadow being given by a vertical iron bar.

KILLOUGH.—Lighthouse, St. John's Point.—The barometer was put up in the hall of the light-keeper's dwelling; the other meteorological instruments were well placed in a garden attached to it. The meridian line was traced on the flagging, at the south side of the house, the shadow being given by a vertical iron rail.

COURTOWN HARBOUR.—The barometer was erected in the guard-house of the station; the thermometers in an inclosed yard at the rear, attached to a wall facing northward; and the rain-gauge on an eminence behind it.

DUNMORE EAST.—The barometer was put up in the guard-house of the station; the thermometers were attached to the northern external wall, and were not completely guarded from radiation. The rain-gauge was fixed to a wall in front.

Buncrana.—The meteorological instruments were put up at the guard-house,—the barometer within, and the thermometers on one of the external walls facing to the north; the site was not favourable.

Killybegs.—This lighthouse is admirably circumstanced for meteorological observations. The Academy's barometer was not put up, the barometer belonging to the lighthouse being found sufficiently good; it was favourably placed in the sitting-room of the light-keeper's dwelling. The thermometers were fixed in an angle of the yard at the rear of the house; the rain-gauge was attached to an iron railing in the front yard. There is a sun-dial in the front yard, the position of which was examined, and found correct.

Westport—Inishgort Lighthouse.—The meteorological instruments were erected at the lighthouse of Inishgort, in charge of the light-keeper. The barometer belonging to the lighthouse was found sufficiently good for the observations; it is placed in the sitting-room of the light-keeper. The thermometers were fixed to one of the external walls facing northward, and the rain-gauge in the small garden attached to the lighthouse.

Kilrush.—The meteorological instruments were erected at the guard-house, close to the quay; the barometer within the guard-house, and the thermometers attached to an external wall. The rain-gauge was fixed at the foot of the flag-staff.

Cahirciveen.—The barometer was erected in the house occupied by the boatman in charge, in the town of Cahirciveen, and the thermometers and rain-gauge in the yard and garden attached to it. Their site was not favourable.

Castletownsend.—The barometer was placed in the guard-house, and the thermometers on one of the external walls facing northward. The rain-gauge was fixed at the foot of the flag-staff. The time of noon was found by means of a dipleidoscope belonging to the officer in command of the station.

*Plan of Observation.*—It is probable that over a tract of country so limited as this island, the distribution of temperature, humidity, and rain, does not vary materially from one year to another; and that, consequently, a tolerable approximation to the laws of this distribution may be obtained from the results of a single year, if every precaution be adopted to insure the perfect comparability

of the results. It was arranged, accordingly, that the observations should be continued at the coast-guard stations until the end of the year 1851, so as to embrace a period of at least one year reckoned from the time when the observers had acquired the power of observing with accuracy. The monthly means for this year may be reduced to their *absolute* mean values, by the help of the more extended series of observations made in Dublin, by which the deviations of any monthly result from its absolute mean value is sufficiently known.

The Committee, upon whom the duty of superintending these arrangements devolved, were desirous that the plan of observation should be the least onerous that could lead satisfactorily to the results aimed at. One of the principal of these—the determination of the movements of masses of air, whether in storms, or in the displacement of atmospheric waves,—demands, as has been said, that the observations should be taken at *equal intervals* of time; and the only condition imposed by the other meteorological problems is, that these times should be so chosen as to furnish the *daily means* of the elements sought. Now *any three* observations, taken *at equal intervals* throughout the day, are sufficient to eliminate the diurnal variation, and therefore to give the *daily means* of *all* the meteorological elements; and undoubtedly, where such a system is practicable, the observations should be taken at 6 A. M., 2 P. M., and 10 P. M., which has been shown to be preferable to any other eight-hourly group for meteorological purposes.*

At the coast-guard stations, however, such a plan of observation would have been incompatible with the regular duties of the men; and it was advisable to adopt a less complete system, which might be followed at all the stations, and in which interruptions were not likely to occur. Fortunately, two observations in the day, taken at equal intervals, are sufficient to give the daily means of all the meteorological elements, excepting the atmospheric pressure; and, as the diurnal variation of the pressure is very small,—much smaller than its irregular fluctuations in these latitudes,—it may be disregarded, and the objects for which the present system was instituted may be attained by taking *two* observations in the day, at *homonymous hours.*

* Transactions of the Royal Irish Academy, vol. xxii. p. 65.

The best pair of homonymous hours, for the determination of the *mean temperature*, and nearly also for that of the *mean humidity*, are $9^h\,46^m$ A. M., and $9^h\,46^m$ P. M.* Limiting themselves to the exact hours, the Committee might accordingly have chosen either 9 A. M. and 9 P. M., or 10 A. M. and 10 P. M.; the former pair was adopted, its superior convenience seeming to outweigh the advantage of the latter in accuracy.

For the fuller elucidation of some of the questions proposed, it was further arranged that *hourly observations* should be taken at all the stations for twenty-four hours, at the equinoxes and solstices, according to the plan laid down by Sir JOHN HERSCHEL. It was likewise provided, that hourly observations should be taken occasionally, under special circumstances, such as storms, unusual disturbances of barometric equilibrium, &c.

For further details of the plan of observation, the reader is referred to the "Instructions" prepared by the Council of the Academy. I now proceed to the results of the observations.

## TEMPERATURE OF THE AIR.

*Corrections.*—It has been already stated, that the thermometers employed in measuring the temperature and humidity of the air were carefully compared with a standard thermometer, and their errors noted. When the errors differed by more than $0°{\cdot}2$ in different parts of the scale, the instrument was rejected; when they did not, the mean of the observed errors was adopted as a constant error for the whole scale of the instrument. Table II. gives the numbers thus obtained for the several instruments; these numbers are applied, with the contrary signs, as corrections to the observed results.

It has been stated that the mean of the temperatures observed at 9 A. M and 9 P. M. is, very nearly, the mean of the entire day. The small corrections required, in order to reduce the former to the latter, are obtained from the bi-hourly observations made at Dublin in the years 1840–1843. Table III. contains the results of that series, giving the mean differences between the temperature at each hour of observation, and that of the entire day.

* See the paper already referred to. The hours $9^h\,30^m$ A. M., and $9^h\,30^m$ P. M., are better for humidity.

Table II. Errors of the Thermometers.

| Station. | Dry Therm. | | Wet Therm. | |
|---|---|---|---|---|
| | No. of Inst. | Error. | No. of Inst. | Error. |
| Portrush, . . . . . | 10 | + 0·5 | 7 | + 0·3 |
| Buncrana, . . . . | 19 | + 0·4 | 11 | + 0·4 |
| Donaghadee, . . . | 5 | + 0·6 | 8 | + 0·6 |
| Killybegs, . . . . | 12 | + 0·5 | 22 | + 0·4 |
| Armagh, . . . . . | — | 0·0 | — | 0·0 |
| Killough, . . . . . | 37 | − 0·3 | 33 | − 0·1 |
| Markree, . . . . . | 1 | + 0·4 | 2 | + 0·4 |
| Westport,* . . . . | — | — | — | — |
| Dublin, . . . . . | — | + 0·1 | — | + 0·2 |
| Portarlington,* . | — | — | — | — |
| Athy, . . . . . | 26 | 0·0 | 35 | − 0·2 |
| Courtown, . . . . | 30 | 0·0 | 34 | + 0·2 |
| Kilrush, . . . . . | 14 | + 0·2 | 21 | + 0·3 |
| Dunmore, . . . . | 28 | − 0·3 | 32 | − 0·3 |
| Cahirciveen, . . . | 16 | + 0·2 | 18 | + 0·2 |
| Castletownsend, . | — | + 0·5 | 27 | − 0·1 |

Table III. Mean Differences between the Temperature at each Hour of Observation, and that of the entire Day, at Dublin.

| | 1 A.M. | 3. | 5. | 7. | 9. | 11. | 1 P.M. | 3. | 5. | 7. | 9. | 11. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January, . . | − 1°·3 | − 1°·8 | − 2°·1 | − 1°·9 | − 0°·8 | + 2°·2 | + 3°·6 | + 3°·0 | + 1°·0 | − 0°·2 | − 0°·5 | − 0°·8 |
| February, . | − 1 ·2 | − 1 ·6 | − 2 ·2 | − 2 ·1 | − 0 ·4 | + 2 ·4 | + 4 ·0 | + 3 ·3 | + 1 ·0 | − 0 ·4 | − 0 ·7 | − 0 ·9 |
| March, . . . | − 3 ·5 | − 3 ·7 | − 3 ·7 | − 3 ·1 | + 0 ·7 | + 4 ·1 | + 6 ·0 | + 5 ·5 | + 2 ·9 | − 0 ·4 | − 1 ·7 | − 2 ·4 |
| April, . . . . | − 4 ·9 | − 5 ·4 | − 5 ·6 | − 1 ·3 | + 2 ·5 | + 5 ·4 | + 6 ·6 | + 6 ·4 | + 4 ·1 | − 0 ·1 | − 2 ·7 | − 3 ·9 |
| May, . . . . | − 5 ·7 | − 6 ·5 | − 5 ·2 | + 0 ·5 | + 2 ·8 | + 4 ·9 | + 5 ·8 | + 6 ·1 | + 4 ·1 | + 0 ·6 | − 2 ·9 | − 4 ·4 |
| June, . . . . | − 6 ·2 | − 7 ·0 | − 4 ·9 | + 2 ·0 | + 3 ·1 | + 4 ·7 | + 5 ·4 | + 5 ·2 | + 4 ·2 | + 1 ·0 | − 2 ·8 | − 4 ·6 |
| July, . . . . | − 4 ·9 | − 5 ·7 | − 4 ·9 | + 0 ·8 | + 2 ·5 | + 4 ·6 | + 5 ·1 | + 5 ·1 | + 3 ·7 | + 0 ·6 | − 2 ·7 | − 4 ·2 |
| August, . . . | − 5 ·0 | − 5 ·4 | − 5 ·7 | − 0 ·9 | + 2 ·6 | + 5 ·1 | + 5 ·9 | + 5 ·6 | + 3 ·9 | + 0 ·2 | − 2 ·6 | − 3 ·7 |
| September, . | − 3 ·7 | − 4 ·2 | − 4 ·2 | − 2 ·4 | + 1 ·7 | + 4 ·8 | + 6 ·0 | + 5 ·0 | + 2 ·9 | − 0 ·6 | − 2 ·1 | − 3 ·2 |
| October, . . | − 2 ·6 | − 3 ·2 | − 3 ·9 | − 3 ·5 | + 0 ·2 | + 4 ·3 | + 5 ·5 | + 4 ·6 | + 1 ·9 | − 0 ·1 | − 1 ·3 | − 1 ·9 |
| November, . | − 1 ·2 | − 1 ·5 | − 1 ·7 | − 1 ·8 | − 0 ·6 | + 2 ·2 | + 3 ·5 | + 2 ·5 | + 0 ·6 | − 0 ·1 | − 0 ·8 | − 1 ·0 |
| December, . | − 0 ·8 | − 1 ·1 | − 1 ·3 | − 1 ·2 | − 0 ·8 | + 1 ·6 | + 2 ·6 | + 1 ·5 | + 0 ·4 | − 0 ·2 | − 0 ·4 | − 0 ·5 |
| Year, . . . . | − 3°·4 | − 3°·9 | − 3°·8 | − 1°·2 | + 1°·1 | + 3°·9 | + 5°·0 | + 4°·5 | + 2°·6 | + 0°·0 | − 1°·8 | − 2°·6 |
| Summer, . . | − 5 ·1 | − 5 ·7 | − 5 ·1 | − 0 ·2 | + 2 ·5 | + 4 ·9 | + 5 ·8 | + 5 ·6 | + 3 ·8 | + 0 ·3 | − 2 ·6 | − 4 ·0 |
| Winter, . . . | − 1 ·8 | − 2 ·1 | − 2 ·5 | − 2 ·3 | − 0 ·3 | + 2 ·8 | + 4 ·2 | + 3 ·4 | + 1 ·3 | − 0 ·2 | − 0 ·9 | − 1 ·2 |

* At Westport and Portarlington the errors of the thermometers were not determined.

From the preceding Table we obtain the following corrections, which are to be applied to the means of the observed temperatures at 9 A. M. and 9 P. M., in order to reduce them to the mean of the day:—

| | | | |
|---|---|---|---|
| April, . . . | corr. = + 0°·1 | October, . . | corr. = + 0°·5 |
| May, . . . | „ + 0·1 | November, | „ + 0·7 |
| June, . . . | „ − 0·1 | December, | „ + 0·6 |
| July, . . . | „ + 0·1 | January, . | „ + 0·7 |
| August, . . | „ + 0·0 | February, . | „ + 0·6 |
| September, | „ + 0·2 | March, . . | „ + 0·5 |

It hence appears that the correction is nearly constant throughout the summer, and throughout the winter months, respectively. The mean summer correction is + 0°·1; the mean winter correction + 0°·6.

*Mean Monthly Temperatures.*—The mean temperatures have been obtained, at all but three of the stations, from the observations at 9 A. M. and 9 P. M., by the application of the preceding corrections. At Markree the observations were taken at 10 A. M. and 10 P. M.; and the reducing numbers are therefore somewhat different, and smaller in amount. At Portarlington and Athy the observations were taken but *once* in the day, namely, at 9 A. M.; and at these stations, accordingly, the mean temperatures are inferred from the maximum and minimum temperatures as given by the self-registering thermometers. The formula employed is that of KÆMTZ, viz.:—

$$mean\ temp. = min. + a\,(max. - min.)$$

The mean value of the coefficient,* as deduced from the observations at the observatories of Armagh, Markree, and Dublin, is $a = 0{\cdot}41$.

The following Table contains the resulting values of the mean temperature for the several months of the year 1851:—

* The coefficient in KÆMTZ's formula appears to vary considerably at different places, both in its mean amount, and in the law of its variation from month to month. At Armagh and Markree its greatest value is in December, and its least in July; at Dublin, it is the reverse. I have taken above the mean of the yearly values for the three stations.

TABLE IV. MEAN TEMPERATURES FOR EACH MONTH OF THE YEAR 1851, AT THE SEVERAL STATIONS.

| Station. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . . . | 42°·0 | 42°·3 | 42° 9 | 45°·7 | 50°·2 | 55°·3 | 56°·5 | 58°·8 | 55°·5 | 51°·3 | 44°·4 | 44°·7 | 49°·1 |
| Buncrana, . . . . | 41 ·6 | 41 ·8 | 43 ·3 | 45 ·4 | 50 ·5 | 55 ·8 | 56 ·9 | 59 ·3 | 55 ·8 | 51 ·2 | 42 ·6 | 44 ·3 | 49 ·0 |
| Donaghadee, . . . | 42 ·8 | 43 ·1 | 43 ·3 | 46 ·6 | 50 ·8 | 55 ·8 | 57 ·0 | 58 ·8 | 56 ·3 | 51 ·8 | 43 ·9 | 45 ·4 | 49 ·6 |
| Killybegs, . . . . | 43 ·8 | 43 ·9 | 45 ·1 | 47 ·1 | 51 ·4 | 56 ·6 | 58 ·1 | 60 ·7 | 58 ·0 | 52 ·7 | 45 ·6 | 46 ·3 | 50 ·8 |
| Armagh, . . . . . | 41 ·4 | 41 ·7 | 42 ·5 | 45 ·4 | 50 ·3 | 56 ·2 | 57 ·1 | 58 ·6 | 55 ·3 | 50 ·4 | 41 ·0 | 43 ·2 | 48 ·6 |
| Killough, . . . . . | 44 ·6 | 44 ·0 | 43 ·9 | 46 ·7 | 51 ·0 | 55 ·2 | 58 ·1 | 59 ·1 | 57 ·2 | 53 ·2 | 43 ·0 | 46 ·6 | 50 ·2 |
| Markree, . . . . . | 39 ·4 | 41 ·2 | 42 ·3 | 45 ·3 | 50 ·1 | 55 ·7 | 56 ·6 | 58 ·7 | 55 ·1 | 49 ·8 | 41 ·8 | 42 ·2 | 48 ·2 |
| Westport, . . . . . | 46 ·3 | 45 ·2 | 46 ·2 | 47 ·3 | 52 ·1 | 56 ·5 | 58 ·3 | 60 ·9 | 58 ·4 | 53 ·7 | 47 ·2 | 47 ·8 | 51 ·7 |
| Dublin, . . . . . | 43 ·6 | 43 ·6 | 44 ·0 | 46 ·8 | 52 ·5 | 58 ·8 | 60 ·2 | 62 ·0 | 55 ·9 | 51 ·9 | 41 ·2 | 43 ·3 | 50 ·3 |
| Portarlington, . . | 40 ·6 | 40 ·6 | 40 ·5 | 43 ·1 | 49 ·1 | 54 ·8 | 57 ·3 | 57 ·7 | 53 ·7 | 50 ·1 | 39 ·4 | 40 ·3 | 47 ·3 |
| Athy, . . . . . | 40 ·7 | 40 ·9 | 41 ·8 | 45 ·4 | 50 ·6 | 56 ·9 | 58 ·2 | 60 ·8 | 53 ·6 | 51 ·0 | 39 ·7 | 41 ·3 | 48 ·4 |
| Courtown, . . . . | 43 ·3 | 43 ·8 | 44 ·3 | 46 ·6 | 52 ·5 | 57 ·3 | 59 ·5 | 60 ·7 | 56 ·5 | 51 ·8 | 41 ·6 | 45 ·1 | 50 ·3 |
| Kilrush, . . . . . | 44 ·2 | 45 ·5 | 45 ·2 | 47 ·0 | 51 ·7 | 56 ·3 | 59 ·1 | 60 ·8 | 58 ·1 | 52 ·5 | 44 ·7 | 45 .1 | 50 ·9 |
| Dunmore, . . . . | 45 ·4 | 44 ·8 | 44 ·8 | 47 ·4 | 53 .3 | 58 ·2 | 61 ·6 | 62 ·3 | 59 ·1 | 53 ·8 | 42 ·6 | 46 ·2 | 51 ·6 |
| Cahirciveen, . . . | 45 ·6 | 46 ·2 | 46 ·4 | 48 ·5 | 53 ·9 | 58 ·2 | 60 ·2 | 62 ·0 | 58 ·7 | 54 ·1 | 46 ·5 | 47 ·0 | 52 ·3 |
| Castletownsend, . | 45 ·4 | 46 ·0 | 46 ·1 | 47 ·9 | 53 ·6 | 57 ·0 | 60 ·7 | 61 ·8 | 59 ·6 | 54 ·1 | 45 ·7 | 46 ·9 | 52 ·1 |

Before we proceed to discuss the mean temperatures in the several months of the year 1851, it is important that we should know the *absolute mean temperatures* at some one station, and thereby the *deviations from the means* in the several months of the year in question. Over a tract of country so limited as Ireland, these deviations will not differ much in different localities; and therefore, knowing them for one station, we are enabled to reduce the results of the single year, with probably sufficient exactness, to their absolute mean values at all the rest.

The absolute mean temperatures of the several months are known, at Dublin, by means of the series of observations made during twelve years at the Magnetical Observatory. The monthly mean temperatures, deduced from that series, are given in the following Table. From the year 1840 to 1843, inclusive, the daily means are those of twelve equidistant hours; from 1844 to 1850, inclusive, they are inferred from the temperatures observed at 10 A. M. and 10 P. M.; and in 1851, from those of 9 A. M. and 9 P. M. In the last line of the Table are given the deviations of the monthly means in 1851, from the *mean* monthly means, as deduced from the twelve years.

TABLE V. MEAN MONTHLY TEMPERATURES AT DUBLIN.

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1840 | 41°·9 | 39°·7 | 42°·0 | 45°·4 | 54°·4 | 59°·4 | 59°·2 | 62°·1 | 53°·1 | 47°·2 | 44°·0 | 39°·8 | 49°·0 |
| 1841 | 36 ·7 | 39 ·7 | 46 ·1 | 47 ·9 | 55 ·2 | 56 ·5 | 57 ·3 | 59 ·4 | 57 ·1 | 48 ·3 | 42 ·3 | 41 ·8 | 49 ·0 |
| 1842 | 38 ·6 | 41 ·8 | 45 ·3 | 46 ·7 | 53 ·0 | 60 ·5 | 58 ·9 | 61 ·6 | 57 ·3 | 46 ·5 | 45 ·4 | 48 ·8 | 50 ·4 |
| 1843 | 42 ·8 | 37 ·9 | 44 ·3 | 47 ·1 | 51 ·3 | 56 ·4 | 60 ·3 | 60 ·4 | 58 ·2 | 47 ·2 | 44 ·9 | 49 ·2 | 50 ·0 |
| 1844 | 41 ·8 | 38 ·4 | 42 ·9 | 50 ·6 | 52 ·9 | 58 ·7 | 59 ·8 | 57 ·0 | 57 ·1 | 49 ·7 | 47 ·4 | 38 ·7 | 49 ·6 |
| 1845 | 41 ·7 | 40 ·3 | 38 ·7 | 48 ·2 | 51 ·3 | 58 ·9 | 58 ·0 | 57 ·8 | 54 ·6 | 51 ·1 | 46 ·3 | 41 ·3 | 49 ·0 |
| 1846 | 46 ·3 | 45 ·2 | 43 ·8 | 46 ·4 | 54 ·4 | 63 ·3 | 61 ·7 | 60 ·7 | 59 ·1 | 51 ·0 | 48 ·5 | 36 ·7 | 51 ·4 |
| 1847 | 42 ·3 | 38 ·7 | 43 ·3 | 46 ·2 | 53 ·6 | 57 ·7 | 64 ·0 | 59 ·9 | 54 ·6 | 51 ·9 | 48 ·8 | 45 ·5 | 50 ·5 |
| 1848 | 37 ·0 | 44 ·3 | 43 ·6 | 45 ·8 | 56 ·9 | 56 ·5 | 60 ·4 | 56 ·6 | 56 ·6 | 49 ·7 | 43 ·2 | 43 ·7 | 49 ·5 |
| 1849 | 42 ·6 | 44 ·4 | 44 ·7 | 43 ·5 | 53 ·6 | 57 ·4 | 60 ·3 | 60 ·0 | 56 ·7 | 50 ·5 | 47 ·0 | 41 ·6 | 50 ·2 |
| 1850 | 39 ·1 | 46 ·6 | 43 ·4 | 49 ·0 | 51 ·8 | 60 ·0 | 61 ·2 | 58 ·9 | 55 ·0 | 47 ·8 | 47 ·5 | 45 ·6 | 50 ·5 |
| 1851 | 43 ·6 | 43 ·6 | 44 ·0 | 46 ·8 | 52 ·5 | 58 ·8 | 60 ·2 | 62 ·0 | 55 ·9 | 51 ·9 | 41 ·2 | 43 ·3 | 50 ·3 |
| Means | 41°·2 | 41°·7 | 43°·5 | 47°·0 | 53°·4 | 58°·7 | 60°.1 | 59°·7 | 56°·3 | 49°·4 | 45°·5 | 43°·0 | 50°·0 |
| Diffs. | +2 ·4 | +1 ·9 | +0 ·5 | −0 ·2 | −0 ·9 | +0 ·1 | +0 ·1 | +2 ·3 | −0 ·4 | +2 ·5 | −4 ·3 | +0 ·3 | +0 ·3 |

It will be seen from this Table, that the temperature in the months of January, February, and October, 1851, was higher than the average temperature, while, in November, it was considerably lower. The mean temperature of the entire year was only 0°·3 above the average.

The depression of temperature in the month of November is a remarkable case of those non-periodic fluctuations to which the attention of meteorologists has been drawn by Professor DOVE. This fluctuation appears to have proceeded from north-east to south-west, and to have been nearly obliterated when it reached the western coast of the island. At the northern and eastern stations the unusual cold began on the 24th day of the month; at the southern and western it commenced on the 26th and 27th. It reached its maximum about the 30th, and ceased about the 3rd of December. When we compare the mean temperatures of November and December at Killough, Dublin, Courtown, and Dunmore, on the eastern coast, with those at Killybegs, Westport, Kilrush, and Cahirciveen, on the western, we observe that the temperature of November is less than that of December by 3°·3 at the former stations, while the defect is only 0°·6 at the latter.

Upon a comparison of the mean yearly temperatures of the several stations, we observe that those of the *inland* stations are *in defect*, as compared with the

corresponding coast stations. Thus the mean temperature of Armagh (48°·6) is less than that of Donaghadee by 1°, and less than that of Killough by 1°·6. The mean temperature of Markree (48°·2) is less than that of Killybegs by 2°·6, and than that of Westport by 3°·5. The mean temperatures of Portarlington and Athy (47°·3 and 48°·4) are in like manner in defect, when compared with those of Dublin and Courtown, and by an intermediate amount. I shall return to this subject hereafter, and merely notice it at present for the purpose of observing that no satisfactory conclusion can be drawn as to the dependence of temperature upon geographical position, unless the inland and coast stations be compared separately.

Confining ourselves for the present to the coast stations, which are the most numerous and the most widely distributed, we observe that there is an increase of mean annual temperature in proceeding *from north to south* of the island, the mean temperature of Portrush and Buncrana being 49°·0, and that of Dunmore, which is nearly on the intermediate meridian, 51°·6. Similarly there is an increase of temperature in proceeding *from east to west*, the mean temperature of Killough and Dublin being 50°·2, and that of Westport, which is nearly on the intermediate parallel, 51°·7.

But for an accurate determination of the rate of increase of temperature in the two directions, it is necessary to combine the results by the method of least squares. For this purpose let $t$ denote the observed mean temperature of any month, at any given station; $T$ the *probable* temperature of the same month at an *assumed* central station; and let the distances (in geographical miles) of the former from the latter, measured on the meridian and perpendicular to the meridian to the north and west, respectively, be denoted by $y$ and $x$; then, if $V$ and $U$ be the increase of temperature corresponding to a single mile in each direction,

$$t = T + Ux + Vy.$$

There will be a similar equation for each station; and combining them by the method of least squares, we shall obtain the most probable values of the unknown quantities $T$, $U$, and $V$.

The simplest mode of employing this method in the present instance is to take, as the arbitrary central station, that whose latitude and longitude are the

arithmetical means of the latitudes and longitudes of the stations of observation. The resulting equations are thus reduced to the following:—

$$nT = \Sigma(t),$$
$$U\Sigma(x^2) + V\Sigma(xy) = \Sigma(xt),$$
$$U\Sigma(xy) + V\Sigma(y^2) = \Sigma(yt).$$

For the reason already stated, I shall employ in this calculation only the results obtained at the coast stations. These are, in the order of latitude, Portrush, Buncrana, Donaghadee, Killybegs, Killough, Westport, Dublin, Courtown, Kilrush, Dunmore, Cahirciveen, Castletownsend. The mean latitude and longitude of these stations are 53° 29′, and 7° 39′ respectively. And we find

$$\Sigma(x^2) = 39094, \quad \Sigma(xy) = -22569, \quad \Sigma(y^2) = 65811.$$

Substituting and eliminating between the second and third equations, we obtain—

$$U = \cdot0000319\ \Sigma(xt) + \cdot0000109\ \Sigma(yt);$$
$$V = \cdot0000109\ \Sigma(xt) + \cdot0000189\ \Sigma(yt).$$

By these formulæ the values of $T$, $U$, and $V$, for each month are calculated. They are given in the following Table:—

TABLE VI. ELEMENTS OF MONTHLY ISOTHERMAL LINES.

| | $T$ | | $U$ | $V$ | $W$ | $u$ |
|---|---|---|---|---|---|---|
| | 1851. | Mean. | | | | |
| January, . . . . . | 44°·1 | 41°·7 | + ·0080 | − ·0102 | ·0130 | 52° |
| February, . . . . | 44 ·2 | 42 ·3 | + ·0093 | − ·0119 | ·0151 | 52 |
| March, . . . . . | 44 ·6 | 44 ·1 | + ·0131 | − ·0064 | ·0146 | 26 |
| April, . . . . . | 46 ·9 | 47 ·1 | + ·0043 | − ·0070 | ·0082 | 59 |
| May, . . . . . | 52 ·0 | 52 ·9 | + ·0012 | − ·0139 | ·0140 | 85 |
| June, . . . . . | 56 ·8 | 56 ·7 | − ·0031 | − ·0109 | ·0114 | 106 |
| July, . . . . . | 58 ·9 | 58 ·8 | − ·0049 | − ·0202 | ·0208 | 104 |
| August, . . . . . | 60 ·6 | 58 ·3 | + ·0029 | − ·0121 | ·0124 | 77 |
| September, . . . . | 57 ·4 | 57 ·8 | + ·0101 | − ·0090 | ·0135 | 42 |
| October, . . . . . | 52 ·7 | 50 ·2 | + ·0059 | − ·0070 | ·0092 | 50 |
| November, . . . . | 44 ·1 | 48 ·4 | + ·0304 | + ·0077 | ·0313 | − 14 |
| December, . . . . | 45 ·7 | 45 ·4 | + ·0103 | − ·0017 | ·0104 | 9 |
| Year, . . . . . | 50 ·7 | 50 ·3 | + ·0073 | − ·0085 | ·0112 | 49° |

The values of $U$ and $V$ being known, the positions of the isothermal lines are determined. The inclination of the isothermal lines to the meridian, measured from north to west, $u$, and the rate of increase of temperature in the direction perpendicular to them, $W$, are known by the formulæ

$$\tan u = \frac{V}{U}, \qquad W = \sqrt{(U^2 + V)^2}.$$

Their values for the several months are given in the foregoing Table.

We see then that, on the mean of the whole year, the isothermal lines are inclined to the meridian by the angle N. 49° W.; and that the temperature increases in a direction perpendicular to these lines, by ·0112 of a degree for each geographical mile, or at the rate of 1 degree for 89 miles. The increase of temperature, in proceeding from north to south, is $V = ·0085$, or 1° in 118 geographical miles; the corresponding increase, in proceeding from east to west, is $U = ·0073$, or 1° in 137 geographical miles.

We learn further, that the *mean annual* isothermal lines furnish a very inadequate representation of the progression of temperature; and that when we follow the course of these lines *from month to month*, we find them to vary within very wide limits. The extreme positions of these lines, as given in the preceding Table, are those for the months of June and November. But the result obtained for the latter month must, I think, be regarded as anomalous, on account of the irregularity in the distribution of temperature already noticed; and, rejecting it, the extreme positions correspond to the two solstitial months. They are the following:—

June, . . . $u =$ N. 106° W., $W = ·0114$,
December, $u =$ N. 9° W., $W = ·0104$;

so that the direction of the isothermal lines varies through an angle of 97° in the course of the year, being nearly parallel to the meridian in December, and nearly perpendicular to it in June. (See Plate VII.)

We may now employ the formula

$$t = T + Ux + Vy,$$

to deduce the *probable* temperature at any place, and compare it with that actually *observed;* we shall thus find the effect due to local causes. Making this calculation for the four *inland* stations, we obtain the results given in the following Table:—

TABLE VII. CALCULATED TEMPERATURES AT INLAND STATIONS.

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Armagh, . . . . | 43°·2 | 43°·2 | 43°·8 | 46°·4 | 51°·2 | 56°·3 | 58°·0 | 59°·9 | 56°·6 | 52°·1 | 43°·4 | 45°·3 | 50°·0 |
| Markree, . . . . | 43 ·8 | 43 ·9 | 44 ·7 | 46 ·7 | 51 ·4 | 56 ·2 | 57 ·8 | 60 ·1 | 57 ·3 | 52 ·5 | 45 ·3 | 45 ·9 | 50 ·5 |
| Portarlington, . | 44 ·2 | 44 ·3 | 44 ·6 | 47 ·0 | 52 ·2 | 57 ·0 | 59 ·3 | 60 ·8 | 57 ·4 | 52 ·7 | 43 ·5 | 45 ·6 | 50 ·7 |
| Athy, . . . . . | 44 ·2 | 44 ·3 | 44 ·5 | 47 ·0 | 52 ·4 | 57 ·2 | 59 ·6 | 60 ·9 | 57 ·4 | 52 ·8 | 43 ·1 | 45 ·5 | 50 ·7 |

Defect of observed Temperatures.

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Armagh, . . . . | 1°·8 | 1°·5 | 1°·3 | 1°·0 | 0°·9 | 0°·1 | 0°·9 | 1°·3 | 1°·3 | 1°·7 | 2°·4 | 2°·1 | 1°·4 |
| Markree, . . . . | 4 ·4 | 2 ·7 | 2 ·4 | 1 ·4 | 1 ·3 | 0 ·5 | 1 ·2 | 1 ·4 | 2 ·2 | 2 ·7 | 3 ·5 | 3 ·7 | 2 ·3 |
| Portarlington, . | 3 ·6 | 3 ·7 | 4 ·1 | 3 ·9 | 3 ·1 | 2 ·2 | 2 ·0 | 3 ·1 | 3 ·7 | 2 ·6 | 4 ·1 | 5 ·3 | 3 ·4 |
| Athy, . . . . . | 3 ·5 | 3 ·4 | 2 ·7 | 1 ·6 | 1 ·8 | 0 ·3 | 1 ·4 | 0 ·1 | 3 ·8 | 1 ·8 | 3 ·4 | 4 ·2 | 2 ·3 |

We learn that the defect of temperature due to inland position is, as might have been expected, least in summer and greatest in winter. A small part of this defect is due to elevation: but it is easily eliminated. The mean height of the instruments at the coast stations above the level of the sea is 30 feet. We have, therefore, only to subduct this from the known heights at the inland stations, and to correct for the difference of level at the rate of 1° Fahr. for 276 feet, which is the mean of the determinations made by Mr. WELSH in his balloon ascents, for the lower portion of the atmosphere lying beneath the great vapour plane. The mean yearly results at the four inland stations, thus corrected, are as follow:—

| | Observed Defect. | Height above Sea. | Correction. | Reduced Defect. |
|---|---|---|---|---|
| Armagh, . . . . | 1°·4 | 211 | − 0°·7 | 0°·7 |
| Markree, . . . . | 2 ·3 | 132 | − 0 ·4 | 1 ·9 |
| Portarlington, . . | 3 ·4 | 230 | − 0 ·7 | 2 ·7 |
| Athy, . . . . | 2 ·3 | 200 | − 0 ·6 | 1 ·7 |
| | | | Mean = | 1°·8 |

## Diurnal Ranges of Temperature.

Climatology depends upon the *ranges* of temperature (whether diurnal, monthly, or annual), no less than upon *mean values;* and their investigation is accordingly a necessary part of the present inquiry. In the present series of observations, the *diurnal ranges* of temperature are given by means of the results obtained with self-registering thermometers. These results are the least satisfactory portion of the whole series. It is well known that the ordinary self-registering thermometers are extremely apt to get out of order, the maximum by the index becoming entangled in the mercury, and the minimum by the distillation of the spirit into the upper part of the tube; and although the observers were carefully instructed in the mode of remedying these derangements, no one (I believe) who has handled such instruments will wonder that men previously unaccustomed to them should have sometimes failed in what is in all cases a somewhat delicate operation. The blanks in the Table of *maximum* temperature at Buncrana and Killybegs, and those in the Table of *minimum* temperature at Killybegs and Dunmore, are due to this cause.

But there is another source of error affecting the *maximum* thermometer, which it is still more difficult to avoid. If the instrument be exposed to the influence of radiation for *any* portion of the day, however short, it will, from its construction, retain the impression made upon it; and consequently, if the abnormal temperature to which it has been thus subjected exceed the greatest temperature of the air in the day, an erroneous result will be recorded. The difficulty of guarding thermometers completely from such influences is well known; and although some trouble was taken to insure this protection, the observations themselves show that it was not effective at all the stations. I have, accordingly, been compelled to reject a portion of the results obtained with the maximum thermometer at Killough, Courtown, Kilrush, and Dunmore, as defective from this cause.

The results are given in the following Tables. Table viii. contains the monthly means of the *maximum* temperature in each day; Table ix. those of the *minimum* temperature; and Table x. the differences of the two preceding, or the monthly means of the *diurnal ranges*.

TABLE VIII. MAXIMUM TEMPERATURES (MONTHLY MEANS).

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 47°·5 | 47°.7 | 47°·7 | 52°·2 | 56°·5 | 61°·9 | 63°·9 | 65°·7 | 63°·3 | 56°·6 | 49°·0 | 48°·2 |
| Buncrana, . . | 45 ·9 | 47 ·1 | 48 ·8 | 52 ·6 | 57 ·1 | 63 ·9 | — | — | — | — | — | — |
| Donaghadee, . | 47 ·8 | 48 ·0 | 48 ·5 | 52 ·3 | 57 ·6 | 63 ·5 | 64 ·2 | 66 ·3 | 63 ·2 | 57 ·0 | 47 ·8 | 48 ·8 |
| Killybegs, . . . | 47 ·8 | 48 ·4 | 50 ·1 | 55 ·1 | 59 ·2 | 62 ·4 | — | — | — | — | — | — |
| Armagh, . . . | 47 ·5 | 47 ·6 | 48 ·4 | 52 ·8 | 57 ·4 | 64 ·5 | 64 ·8 | 67 ·0 | 62 ·9 | 56 ·4 | 45 ·7 | 47 ·0 |
| Killough, . . . | 48 ·8 | 47 ·6 | 48 ·8 | — | — | — | — | — | — | 59 ·1 | 48 ·5 | 48 ·6 |
| Markree, . . . | 46 ·6 | 48 ·0 | 49 ·5 | 53 ·3 | 58 ·4 | 67 ·4 | 65 ·9 | 67 ·2 | 64 ·1 | 56 ·3 | 48 ·0 | 46 ·9 |
| Dublin, . . . . | 50 ·1 | 49 ·5 | 49 ·8 | 53 ·3 | 58 ·3 | 65 ·5 | 65 ·7 | 68 ·4 | 62 ·9 | 58 ·4 | 46 ·7 | 48 ·6 |
| Portarlington, | 48 ·0 | 48 ·3 | 48 ·8 | 52 ·8 | 58 ·8 | 66 ·0 | 66 ·0 | 67 ·6 | 64 ·9 | 57 ·9 | 46 ·6 | 46 ·6 |
| Athy, . . . . . | 47 ·5 | 47 ·7 | 49 ·2 | 54 ·2 | 59 ·0 | 66 ·6 | 66 ·7 | 69 ·6 | 62 ·6 | 57 .7 | 45 ·8 | 46 ·4 |
| Courtown, . . | — | — | — | — | — | — | 67 ·2 | 69 ·2 | 64 ·6 | 58 ·7 | 47 ·4 | 48 ·9 |
| Kilrush, . . . . | 49 ·0 | 49 ·3 | 50 ·4 | — | — | — | — | — | — | 57 3 | 49 ·0 | 48 ·1 |
| Dunmore, . . . | 48 ·6 | 48 ·4 | 50 ·5 | — | — | — | — | — | — | 54 ·9 | 45 ·0 | 48 ·1 |
| Cahirciveen, . | 50 ·2 | 49 ·6 | 49 ·7 | — | — | — | — | — | 63 ·5 | 57 ·1 | 50 ·2 | 49 ·7 |
| Castletownsend, | 50 ·1 | 50 ·5 | 52 ·0 | 54 ·1 | 61 ·3 | 64 ·3 | 66 ·7 | 68 ·3 | 65 ·3 | 57 ·9 | 47 ·6 | 47 ·0 |

TABLE IX. MINIMUM TEMPERATURES (MONTHLY MEANS).

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 36°·2 | 36°·8 | 37°·2 | 40°·0 | 45°·4 | 49°·8 | 52°·5 | 53°·0 | 49°·6 | 46°·1 | 39°·6 | 38°·8 |
| Buncrana, . . | 37 ·1 | 36 ·8 | 38 ·1 | 39 ·4 | 45 ·4 | 49 ·9 | 52 ·4 | 53 ·5 | 49 ·1 | 45 ·8 | 37 ·8 | 38 ·9 |
| Donaghadee, . | 39 ·3 | 40 ·0 | 39 ·6 | 43 ·4 | 46 ·9 | 50 ·9 | 53 ·0 | 54 ·3 | 53 ·0 | 47 ·6 | 39 ·9 | 41 ·9 |
| Killybegs, . . | 39 ·9 | 39 ·7 | 41 ·1 | 41 ·5 | 46 ·5 | 49 ·1 | — | — | — | — | — | — |
| Armagh, . . . | 35 ·7 | 36 ·9 | 36 ·7 | 39 ·3 | 44 ·3 | 50 ·2 | 52 ·3 | 53 ·3 | 50 ·3 | 45 ·9 | 36 ·6 | 38 ·6 |
| Killough, . . . | 40 ·2 | 39 ·0 | 39 ·2 | 41 ·6 | 44 ·6 | 49 ·8 | 52 ·3 | 53 ·6 | 51 ·6 | 47 ·0 | 36 ·5 | 40 ·0 |
| Markree, . . . | 34 ·4 | 36 ·0 | 36 ·1 | 38 ·9 | 44 ·8 | 50 ·0 | 52 ·9 | 54 ·4 | 49 ·7 | 46 ·8 | 38 ·1 | 38 ·0 |
| Dublin, . . . . | 41 ·0 | 41 ·2 | 40 ·6 | 43 ·0 | 47 ·0 | 52 ·0 | 54 ·8 | 57 ·2 | 51 ·0 | 48 ·4 | 38 ·7 | 40 ·6 |
| Portarlington, | 35 ·5 | 35 ·1 | 34 ·8 | 36 ·4 | 42 ·4 | 47 ·1 | 51 ·2 | 50 ·7 | 45 ·9 | 44 ·7 | 34 ·4 | 35 ·9 |
| Athy, . . . . . | 36 ·0 | 36 ·1 | 36 ·7 | 39 ·2 | 44 ·8 | 50 ·1 | 52 ·4 | 54 ·7 | 47 ·3 | 46 ·3 | 35 ·4 | 37 ·7 |
| Courtown, . . | 36 ·2 | 38 ·0 | 38 ·0 | 41 ·2 | 46 ·0 | 50 ·9 | 54 ·1 | 55 ·6 | 50 ·6 | 46 ·3 | 36 ·1 | 40 ·4 |
| Kilrush, . . . | 39 ·5 | 40 ·2 | 40 ·3 | 42 ·1 | 47 ·4 | 49 ·0 | 52 ·2 | 54 ·0 | 50 ·0 | 45 ·2 | 38 ·3 | 41 ·4 |
| Dunmore, . . . | 39 ·2 | 39 ·9 | 40 ·0 | 42 ·7 | 47 ·5 | 53 ·0 | 56 ·6 | 58 ·8 | 55 ·5 | — | — | — |
| Cahirciveen, . | 41 ·2 | 42 ·3 | 42 ·2 | 43 ·9 | 49 ·1 | 53 ·2 | 56 ·0 | 58 ·6 | 54 ·4 | 50 ·2 | 43 ·0 | 43 ·1 |
| Castletownsend, | 40 ·7 | 41 ·6 | 40 ·4 | 42 ·9 | 47 ·7 | 51 ·3 | 55 ·1 | 57 ·4 | 55 ·0 | 49 ·6 | 40 ·7 | 42 ·7 |

TABLE X. DIURNAL RANGES OF TEMPERATURE (MONTHLY MEANS).

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 11°·3 | 10°·9 | 10°·5 | 12°·2 | 11°·1 | 12°·1 | 11°·4 | 12°·7 | 13°·7 | 10°·5 | 9°·4 | 9°·4 |
| Buncrana, . . | 8 ·8 | 10 ·3 | 10 ·7 | 13 .2 | 11 ·7 | 14 ·0 | — | — | — | — | — | — |
| Donaghadee, . | 8 ·5 | 8 ·0 | 8 ·9 | 8 ·9 | 10 ·7 | 12 ·6 | 11 ·2 | 12 ·0 | 10 ·2 | 9 ·4 | 7 ·9 | 6 ·9 |
| Killybegs, . . | 7 ·9 | 8 ·7 | 9 ·0 | 13 ·6 | 12 ·7 | 13 ·3 | — | — | — | — | — | — |
| Armagh, . . . | 11 ·8 | 10 ·7 | 11 ·7 | 13 ·5 | 13 ·1 | 14 ·3 | 12 ·5 | 13 ·7 | 12 ·6 | 10 ·5 | 9 ·1 | 8 ·4 |
| Killough, . . . | 8 ·6 | 8 ·6 | 9 ·6 | — | — | — | — | — | — | 12 ·1 | 12 ·0 | 8 ·6 |
| Markree, . . . | 12 ·2 | 12 ·0 | 13 ·4 | 14 ·4 | 13 ·6 | 17 ·4 | 13 ·0 | 12 ·8 | 14 ·4 | 9 ·5 | 9 ·9 | 8 ·9 |
| Dublin, . . . . | 9 ·1 | 8 ·3 | 9 ·2 | 10 ·3 | 11 ·3 | 13 ·5 | 10 ·9 | 11 ·2 | 11 ·9 | 10 ·0 | 8 ·0 | 8 ·0 |
| Portarlington, | 12 ·5 | 13 ·2 | 14 ·0 | 16 ·4 | 16 ·4 | 18 ·9 | 14 ·8 | 16 ·9 | 19 ·0 | 13 ·2 | 12 ·2 | 10 ·7 |
| Athy, . . . . . | 11 ·5 | 11 ·6 | 12 ·5 | 15 ·0 | 14 ·2 | 16 ·5 | 14 ·3 | 14 ·9 | 15 ·3 | 11 ·4 | 10 ·4 | 8 ·7 |
| Courtown, . . | — | — | — | — | — | — | 13 ·1 | 13 ·6 | 14 ·0 | 12 ·4 | 11 ·3 | 8 ·5 |
| Kilrush, . . . | 9 ·5 | 9 ·1 | 10 ·1 | — | — | — | — | — | — | 12 ·1 | 10 ·7 | 6 ·7 |
| Dunmore, . . . | 9 ·4 | 8 ·5 | 10 ·5 | — | — | — | — | — | — | — | — | — |
| Cahirciveen, . | 9 ·0 | 7 ·3 | 7 ·5 | — | — | — | — | — | 9 ·1 | 6 ·9 | 7 ·2 | 6 ·6 |
| Castletownsend, | 9 ·4 | 8 ·9 | 11 ·6 | 11 ·2 | 13 ·6 | 13 ·0 | 11 ·6 | 10 ·9 | 10 ·3 | 8 ·3 | 6 ·9 | 4 ·3 |

In the following Table are given the results of the last of the preceding, combined in yearly and half-yearly periods, retaining only those stations at which one or other of the two half-years is complete:—

TABLE XI. DIURNAL RANGES (HALF-YEARLY AND YEARLY MEANS).

| Station. | Summer. | Winter. | Year. |
|---|---|---|---|
| Portrush, . . . . | 12°·2 | 10°·3 | 11°·3 |
| Donaghadee, . . . | 10 ·9 | 8 ·3 | 9 ·6 |
| Armagh, . . . . . | 13 ·3 | 10 ·4 | 11 ·8 |
| Killough, . . . . . | — | 9 ·9 | — |
| Markree, . . . . . | 14 ·3 | 11 ·0 | 12 ·6 |
| Dublin, . . . . . | 11 ·5 | 8 ·8 | 10 ·1 |
| Portarlington, . . | 17 ·1 | 12 ·6 | 14 ·9 |
| Athy, . . . . . | 15 ·0 | 11 ·0 | 13 ·0 |
| Kilrush, . . . . . | — | 9 ·7 | — |
| Cahirciveen, . . . | — | 7 ·4 | — |
| Castletownsend, . | 11 ·8 | 8 ·2 | 10 ·0 |
| Coast Stations, . | 11°·6 | 8°·9 | 10°·3 |
| Inland do., . . . | 14 ·9 | 11 ·3 | 13 ·1 |
| Differences, . . | 3 ·3 | 2 ·4 | 2 ·8 |

From the mean results of the preceding Table, we learn that the diurnal range is greater at the *inland* than at the *coast* stations, the mean excess being 2·8 degrees. The excess is greater in summer than in winter, being 3°·3 in the former, and 2°·4 in the latter season.

We are now in a position to refer to one, at least, of the practical inferences which may be deduced from the preceding results.

The climatological conditions connected with temperature, which favour the prevention or cure of diseases of the lungs, are, firstly, a high winter temperature; and secondly, a small amount of diurnal range. It has been already stated that Ireland is well circumstanced as to these conditions; let us now inquire which is its most favourable region as respects them.

The months of lowest temperature in Ireland, and which are on that account the most trying to the patients above alluded to, are those of December, January, February, and March. During these months the mean temperature varies very little, the mean range at Dublin being from 41°·7, in January, to 45°·4, in March, or only 3·7 degrees. Now the mean direction of the isothermal lines for these four months is N. 37° W.; so that the highest mean temperature for these months is to be found on the south-western coast, not far from Valentia.

The second condition above mentioned, although not frequently taken into account, is, perhaps, still more important. In proof of this it may be mentioned that in Norway, which is remarkable for the small amount of the diurnal range of temperature, consumption is uncommon, even in the highest latitudes; while in parts of Sweden, where this condition does not hold, it is very prevalent. Now, we learn from Table XI., that among the stations at which observations were made in 1851, the winter diurnal range of temperature is least at Cahirciveen. Both conditions, therefore, point to the south-western coast of Kerry as the region in Ireland most favourable to patients affected with these formidable maladies.

I am not in possession of any statistical data bearing upon this question, and am therefore unable to say how far the conclusion thus drawn is borne out by facts.

### TEMPERATURE OF THE SEA.

Provision was made that the temperature of the sea should be observed at all the places at which tidal observations were made. For this purpose each station was furnished with a thermometer, having its bulb inclosed within a small reservoir of copper, for the double purpose of guarding it from accident, and of protecting it (by means of the contained water) from rapid changes of temperature when it was lifted into the air for observation. The observer was instructed to note its indications twice in the day, at intervals of about twelve hours, the thermometer being attached to a pole, and plunged to the depth of about one foot in deep water. The diurnal change of the temperature of the sea being very small, it is completely eliminated by two such observations. At many of the stations the instrument was lost, or broken, in the attempt to use it during boisterous weather. We are, therefore, only in possession of results from six stations, which are contained in the following Table:—

TABLE XII. TEMPERATURE OF THE SEA (MONTHLY MEANS).

| Station. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . . | 46°·9 | 45°·6 | 45°·7 | 47 ·9 | 50°·6 | 54°·3 | 57°·5 | 58°·7 | 58°·7 | 54°·9 | 49°·6 | 47°·8 | 51°·5 |
| Cushendall, . . . | 46 ·6 | 45 ·7 | 45 ·6 | 47 ·2 | 49 ·1 | 52 ·1 | 55 ·4 | 57 ·0 | 58 ·3 | 55 ·6 | 51 ·6 | 49 ·4 | 51 ·1 |
| Donaghadee, . . | 46 ·5 | 45 ·6 | 45 ·6 | 48 ·1 | 50 ·3 | 52 ·5 | 55 ·8 | 57 ·4 | 57 ·5 | 54 ·7 | 50 ·1 | 49 ·3 | 51 ·1 |
| Bunown, . . . . | 48 ·7* | 49 ·4 | 50 ·9 | 51 ·4 | 54 ·4 | 57 ·8 | 60 ·2 | 62 ·9 | 61 ·5 | 55 ·1 | 49 ·3 | 48 ·1 | 54 ·1 |
| Courtown, . . . . | 46 ·0* | 45 ·1 | 45 ·8 | 48 ·3 | 53 ·2 | 58 ·4 | 61 ·8 | 63 .5 | 60 ·9 | 56 ·1 | 47 ·9 | 46 ·8 | 52 ·8 |
| Castletownsend, | 47 ·1 | 46 ·6 | 46 ·8 | 49 ·7 | 53 ·5 | 56 ·3 | 60 ·3 | 61 ·3 | 60 ·3 | 54 ·8 | 49 ·2 | 48 ·6 | 52 ·9 |
| Means, . . . . . | 47 ·0 | 46°·3 | 46°·7 | 48°·8 | 51°·9 | 55°·2 | 58°·5 | 60°·1 | 59°·5 | 55°·2 | 49°·6 | 48°·3 | 52°·3 |
| Differences, . . . | −5 ·3 | −5 ·9 | −5 ·6 | −3 ·5 | −0 ·4 | +3 ·0 | +6 ·2 | +7 ·9 | +7 ·2 | +3 ·0 | −2 ·6 | −3 ·9 | |

In the last two lines of the Table are given the mean results of the six stations, and the differences between them and the mean of the entire year. These

* At Bunown and Courtown no observations of sea temperature were made in January. The results in the Table for that month are the means of the temperatures of December and February.

numbers accordingly exhibit the law of the *annual variation* of sea temperature, around the coasts of Ireland; and the remarkable regularity in their progression shows that, even from the results of a single year, we obtain a close approximation to the actual law.

We learn from these numbers that the annual change of the sea temperature, at the surface, differs considerably from that of the air above it, the difference consisting chiefly in a *retardation* of the epochs of maximum and minimum. Thus the minimum temperature occurs in the middle of February, and the maximum in the middle of August,—or about a month after the corresponding epochs of the temperature of the air. The annual range is also, as might have been expected, considerably less than that of the air. These results accord sufficiently well with the conclusions drawn by KÆMTZ, from a comparison of the results of many voyagers.

But the most interesting result is that concerning the relation between the temperature of the sea at the surface, and that of the superincumbent air. Upon this subject the greatest discordance exists in the statements of different observers. According to HUMBOLDT, the mean temperature of the Atlantic Ocean, at the surface, is in all cases higher than that of the atmosphere above it. This conclusion is confirmed by the observations of PERON and FITZROY, and is contradicted by those of IRVING, FORSTER, and KOTZEBUE. From an elaborate discussion of the observations of many voyagers, KÆMTZ infers that the temperature of the sea is *less* than that of the air over the land in the lower latitudes, while in the higher latitudes it is *greater;* the difference seldom, however, exceeding 1° Fahr. The original conclusion of HUMBOLDT, however, seems to be placed beyond all doubt by the recent observations of Captain DUPERREY, which appear to be more numerous, and taken with more precautions to insure accuracy, than any preceding. It seems now to be generally admitted that, in the *temperate* and *polar* regions, the temperature of the sea is *higher* than that of the air; and the only question that remained was as to the tropics. Now the observations of DUPERREY were made all round the globe, between 10° N. and 10° S. latitude; and they were taken at intervals of four hours, so as completely to eliminate the effects of the diurnal change. From these observations it appears that the temperature of the sea is higher than that of the air within the

zone already mentioned, the mean excess in the Atlantic being 0°·83 Fahr., and in the Great Ocean about half that amount.

The present observations possess much interest in connexion with these questions. In order to perceive their bearing, I have, in the Table which follows, given the half-yearly and yearly means of the sea-temperature at the several stations, together with the differences between them and the corresponding means of the temperature of the air. At Cushendall and Bunown no observations of the temperature of the air were actually made; and for these stations, consequently, the latter means are calculated from the isothermal lines.

TABLE XIII. TEMPERATURE OF THE SEA (YEARLY AND HALF-YEARLY MEANS).

| Station. | Summer. | | Winter. | | Year. | |
|---|---|---|---|---|---|---|
| | Temp. | Excess. | Temp. | Excess. | Temp. | Excess. |
| Portrush, . . . . | 54°·6 | +1°·0 | 48°·4 | +3°·8 | 51°·5 | +2°·4 |
| Cushendall, . . . | 53 ·2 | −1 ·0 | 49 ·1 | +4 ·4 | 51 ·1 | +1 ·7 |
| Donaghadee, . . . | 53 ·6 | −0 ·6 | 48 ·6 | +3 ·6 | 51 ·1 | +1 ·5 |
| Bunown, . . . . . | 58 ·0 | +2 ·4 | 50 ·2 | +3 ·2 | 54 ·1 | +2 ·8 |
| Courtown, . . . . | 57 ·7 | +2 ·2 | 47 ·9 | +3 ·0 | 52 ·8 | +2 ·6 |
| Castletownsend, . | 56 ·9 | +0 ·1 | 48 ·9 | +1 ·5 | 52 ·9 | +0 ·8 |
| Means, . . . . . | . . . . | +0°·7 | . . . . | +3°·3 | . . . . | +2°·0 |

It appears from the last line of this Table, that the temperature of the sea is, upon the mean of the entire year, 2°·0 higher than that of the air above the coast. The excess is 3°·3 in winter, and 0°·7 in summer. There appears also to be considerable diversity in the amount of the excess at the different stations; it is greatest, on the mean of the entire year, at Bunown, and least at Castletownsend.

This excess of the temperature of the sea above that of the air furnishes the explanation of the fact already noticed,—namely, the diminution of the temperature of the air in proceeding from the coasts inland; for it is obvious that the air in the vicinity of the sea must have its temperature raised by contact with the water.

It follows also, that the *absolute* excess of sea temperature considerably exceeds that above stated. Thus, we have seen, the temperature of the sea, on the average of the entire year, exceeds that of the air *over the coasts* by 2°·0; while the latter temperature exceeds that of the *air inland* (for the same latitude and longitude) by 1°·8. The total excess of the sea temperature above that of the air amounts, therefore, to 3°·8 Fahrenheit.

This excess, which appears to be much greater than has been observed elsewhere, is to be ascribed, mainly, to the influence of the gulf-stream upon the temperature of that part of the ocean which bathes our shores. But there is likewise another cause which undoubtedly contributes also to the effect. It has been shown by MAYER and JOULE, that heat is generated by the friction of fluids in motion, and the latter experimentalist has established the important physical law, that there is a definite relation between the heat so produced, and the mechanical power expended by the moving mass. Mr. RANKINE has already applied this principle to explain the fact, observed by M. RENOU, namely, that the temperature of the river Loire at Vendôme is higher than that of the air above it; and it is obvious that a similar explanation is applicable to the phenomenon under consideration. There is no doubt as to the reality of the cause; the only question can be as to the magnitude of the effect to be ascribed to it. That such effect is, at all events, *sensible*, I infer from two circumstances. The first of these is, that the phenomenon of the excess of sea temperature appears to be *general*, and must, therefore, be the effect of some general cause; the second is, that on the coasts of Ireland there is no sensible difference between the amount of the excess on the *eastern* and on the *western* shores.*

Should the effect of this cause be found to be sensible, and its amount be determined, our views of the cycle of meteorological phenomena would be much enlarged. The elevation of temperature rarefies the air; the denser air flows in to supply the partial vacuum, and wind is produced; and finally, this wind,

* There is another corroborating circumstance which perhaps deserves also to be mentioned. Most bathers have, I believe, noticed the fact that the sea appears warmer, *cæteris paribus*, when agitated than when at rest. I am not aware that any direct thermometrical measures have ever been made to establish the fact thus evidenced by the senses; and I need not say that, if established, it would bear the whole weight of the hypothesis above proposed.

both by its own motion, and by that of the ocean which is so subject to its power, restores again the heat which had been converted. Thus the normal condition of temperature is preserved, not only throughout the changes which render it latent and sensible, in the generation and condensation of vapour, but also in its conversion into mechanical power and its reproduction, in the phenomena of the tempest and of the billowy sea.

## BAROMETRIC PRESSURE.

The following Table contains the monthly means of the observed pressures, diminished by 28 inches, and reduced to 32° Fahr.:—

TABLE XIV. MONTHLY MEANS OF BAROMETRIC PRESSURE.*

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 1·444 | 1·901 | 1·628 | 1·840 | 2·030 | 1·888 | 1·790 | 1·939 | 2·150 | 1·703 | 1 976 | 2·123 |
| Buncrana, . . . | 1·377 | 1 827 | 1·580 | 1·777 | 1·968 | 1·849 | 1·760 | 1·886 | 2·118 | 1·681 | 1·972 | 2·102 |
| Donaghadee, . | 1·496 | 1·930 | 1·652 | 1·852 | 2·036 | 1·915 | 1·798 | 1·948 | 2·152 | 1·728 | 1·950 | 2·148 |
| Killybegs, . . . | 1·415 | 1·868 | 1·622 | 1·822 | 2·032 | 1·918 | 1·828 | 1·938 | 2·126 | 1·718 | 2·008 | 2·112 |
| Armagh, . . . | 1·284 | 1·722 | 1·448 | 1·640 | 1·836 | 1·716 | 1·603 | 1·757 | 1·958 | 1·540 | 1·796 | 1·942 |
| Killough, . . . | 1·514 | 1·932 | 1·666 | 1·852 | 2·030 | 1·922 | 1·806 | 1·963 | 2·138 | 1·751 | 1·943 | 2·083 |
| Markree, . . . | 1·356 | 1·833 | 1·537 | 1·741 | 1·954 | 1·828 | 1·730 | 1·859 | 2·051 | 1·648 | 1·933 | 2·040 |
| Westport, . . . | 1·323 | 1·877 | 1·655 | 1·831 | 2·042 | 1·900 | 1·802 | 1·909 | 2·092 | 1·705 | 2·013 | 2·074 |
| Dublin, . . . . | 1·569 | 1·989 | 1·718 | 1·887 | 2·088 | 1·986 | 1·860 | 2·046 | 2·206 | 1·815 | 2·040 | 2·221 |
| Portarlington, | 1·286 | 1·687 | 1·419 | 1·595 | 1·834 | 1·646 | 1·592 | 1·696 | 1·897 | 1·520 | 1·764 | 1·922 |
| Athy, . . . . . | 1·259 | 1·658 | 1·416 | 1·566 | 1·763 | 1·665 | 1·556 | 1·668 | 1·889 | 1·533 | 1·753 | 1·914 |
| Courtown, . . | 1·570 | 1·974 | 1·710 | 1·861 | 2·066 | 1·983 | 1·852 | 2·008 | 2·192 | 1·836 | 2·020 | 2·205 |
| Kilrush, . . . . | 1·428 | 1·852 | 1·646 | 1·783 | 1·998 | 1·896 | 1·798 | 1·925 | 2·117 | 1·781 | 2·047 | 2·120 |
| Dunmore, . . . | 1·511 | 1·910 | 1·666 | 1·804 | 2·010 | 1·930 | 1·804 | 1·942 | 2·130 | 1·786 | 1·980 | 2·144 |
| Cahirciveen, . | 1·484 | 1·884 | 1·678 | 1·787 | 2·026 | 1·926 | 1·826 | 1·949 | 2·121 | 1·797 | 2·078 | 2·158 |
| Castletownsend, | 1·528 | 1·948 | 1·741 | 1·838 | 2·072 | 1·986 | 1·854 | 1·980 | 2·152 | 1·831 | 2·084 | 2·192 |

The next Table contains the constant corrections to be applied to the preceding results. The first column gives the diameters of the tubes; the second, the instrumental corrections obtained by comparison of the several instruments with the Dublin standard by means of portable barometers; the third, the reductions to the sea-level, calculated at the rate of ·0011 of an inch for each

* The pressure for January, at Westport, is the mean of 17 days only, viz., Jan. 15–31; and that for August, at Dublin, is the mean of 15 days, viz., Aug. 1–14.

foot of altitude; and the fourth, the sums of the two preceding, or the total corrections.

These results are incomplete, no comparisons having been made of the barometers at the four inland stations. For this reason, and also because of the uncertainty attending the comparison of barometers by means of portable instruments, I have thought it necessary to seek the corrections also by comparison of the observed results themselves. In comparisons of the latter kind, where the stations are widely separated, it seems necessary to employ the means of somewhat extended series of observed results, during which the fluctuations of barometric pressure are small. I have accordingly selected for the purpose the monthly means of May, July, and September, in which months there was but little variation of barometric equilibrium. The defects of the means at each station compared with those at Dublin, for these months, are given in the fifth, sixth, and seventh columns of the Table; and the last column contains the inferred corrections, which are equal to the mean differences + ·021 (the reduction of the Dublin results to the sea-level).

TABLE XV. BAROMETRIC CORRECTIONS.

| Station. | Diameter of Tube. | Instrumental Correction. | Reduction to Sea-level. | Total Correction. | Difference from Dublin. | | | Correction by Comparison. |
|---|---|---|---|---|---|---|---|---|
| | | | | | May. | July. | Sept. | |
| Portrush, . . . | ·28 | + ·032 | + ·032 | + ·064 | ·058 | ·070 | ·056 | + ·082 |
| Buncrana, . . . | ·34 | + ·017 | + ·053 | + ·070 | ·120 | ·100 | ·088 | + ·124 |
| Donaghadee, . | ·30 | + ·049 | + ·018 | + ·067 | ·052 | ·062 | ·054 | + ·077 |
| Killybegs, . . . | — | − ·052 | + ·022 | − ·030 | ·056 | ·032 | ·080 | + ·077 |
| Armagh, . . . | ·57 | — | + ·232 | — | ·252 | ·257 | ·248 | + ·273 |
| Killough, . . . | ·28 | − ·030 | + ·025 | − ·005 | ·058 | ·054 | ·068 | + ·081 |
| Markree, . . . | — | — | + ·145 | — | ·134 | ·130 | ·155 | + ·161 |
| Westport, . . . | — | − ·007 | + ·019 | + ·012 | ·046 | ·058 | ·114 | + ·094 |
| Dublin, . . . . | ·55 | + ·003 | + ·021 | + ·021 | ·000 | ·000 | ·000 | + ·021 |
| Portarlington, | — | — | + ·253 | — | ·254 | ·268 | ·309 | + ·298 |
| Athy, . . . . . | — | — | + ·220 | — | ·325 | ·304 | ·317 | + ·336 |
| Courtown, . . | ·28 | + ·028 | + ·037 | + ·040 | ·022 | ·008 | ·014 | + ·036 |
| Kilrush, . . . . | ·32 | + ·095 | + ·021 | + ·116 | ·090 | ·062 | ·089 | + ·101 |
| Dunmore, . . . | ·32 | + ·019 | + ·073 | + ·092 | ·078 | ·056 | ·076 | + ·091 |
| Cahirciveen, . | ·38 | + ·034 | + ·057 | + ·091 | ·062 | ·034 | ·085 | + ·081 |
| Castletownsend, | ·26 | + ·012 | + ·020 | + ·072 | ·016 | ·006 | ·054 | + ·046 |

It will be seen by comparing the resulting corrections, in the fourth and last columns of the preceding Table, that the agreement is satisfactory, except at

the four stations, Buncrana, Killybegs, Killough, and Westport; the corrections inferred from a comparison of the *results* being, at these stations, considerably greater than those deduced by a comparison of the *instruments*. This may possibly be due, in part, to the entrance of air into the barometer tubes; but there seems reason to apprehend that the discrepancy may be also partly due to errors of observation, and that of a systematic kind,—the observers at the foregoing stations, having shown less aptitude than others for this kind of duty. Under the circumstances, the corrections deduced by the latter method seem the more reliable. They have accordingly been applied to all the selected observations hereafter discussed.

Applying the foregoing corrections to the results of Table XIV., we obtain the numbers of the following Table:—

TABLE XVI. MONTHLY MEANS OF BAROMETRIC PRESSURE, CORRECTED AND REDUCED TO MEAN SEA-LEVEL.

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 1·526 | 1·983 | 1·710 | 1·922 | 2·112 | 1·970 | 1·872 | 2·021 | 2·232 | 1·785 | 2·058 | 2·205 | 1·950 |
| Buncrana, . . . | 1·501 | 1·951 | 1·704 | 1·901 | 2·092 | 1·973 | 1·884 | 2·010 | 2·242 | 1·805 | 2·096 | 2·226 | 1·949 |
| Donaghadee, . | 1·573 | 2·007 | 1·729 | 1·929 | 2·113 | 1·992 | 1·875 | 2·025 | 2·229 | 1·805 | 2·027 | 2·225 | 1·961 |
| Killybegs, . . . | 1·492 | 1·945 | 1·700 | 1·900 | 2·110 | 1·995 | 1·905 | 2·015 | 2·203 | 1·795 | 2·085 | 2·190 | 1·944 |
| Armagh, . . . | 1·557 | 1·995 | 1·721 | 1·913 | 2·110 | 1·989 | 1·876 | 2·030 | 2·231 | 1·813 | 2·069 | 2·215 | 1·960 |
| Killough, . . . | 1·595 | 2·013 | 1·747 | 1·933 | 2·111 | 2·003 | 1·887 | 2·044 | 2·219 | 1·832 | 2·024 | 2·164 | 1·964 |
| Markree, . . . | 1·517 | 1·994 | 1·698 | 1·902 | 2·115 | 1·989 | 1·891 | 2·020 | 2·212 | 1·809 | 2·094 | 2·201 | 1·954 |
| Westport, . . . | 1·417 | 1·971 | 1·749 | 1·925 | 2·136 | 1·994 | 1·896 | 2·003 | 2·186 | 1·800 | 2·107 | 2·168 | 1·946 |
| Dublin, . . . . | 1·590 | 2·010 | 1·739 | 1·908 | 2·109 | 2·007 | 1·881 | 2·067 | 2·227 | 1·836 | 2·061 | 2·242 | 1·973 |
| Portarlington, | 1.584 | 1·985 | 1·717 | 1·893 | 2·132 | 1·944 | 1·890 | 1·994 | 2·195 | 1·818 | 2·062 | 2·220 | 1·953 |
| Athy, . . . . . | 1·595 | 1·994 | 1·752 | 1·902 | 2·100 | 2·001 | 1·892 | 2·004 | 2·225 | 1·870 | 2·090 | 2·250 | 1·973 |
| Courtown, . . | 1·606 | 2·010 | 1·746 | 1·897 | 2·102 | 2·019 | 1·888 | 2·044 | 2·228 | 1·872 | 2·056 | 2·241 | 1·976 |
| Kilrush, . . . . | 1·529 | 1·953 | 1·747 | 1·884 | 2·100 | 1·997 | 1·900 | 2·026 | 2·218 | 1·882 | 2·148 | 2·221 | 1·967 |
| Dunmore, . . . | 1·602 | 2·001 | 1·757 | 1·895 | 2·101 | 2·021 | 1·895 | 2·033 | 2·221 | 1·877 | 2·071 | 2·235 | 1·976 |
| Cahirciveen, . | 1·565 | 1·965 | 1·759 | 1·868 | 2·107 | 2·007 | 1·907 | 2·030 | 2·202 | 1·878 | 2·159 | 2·239 | 1·974 |
| Castletownsend, | 1·574 | 1·994 | 1·787 | 1·884 | 2·118 | 2·032 | 1·900 | 2·026 | 2·198 | 1·877 | 2·130 | 2·238 | 1·980 |

In order to perceive more clearly the simultaneous variations in the distribution of pressure, I have, in the following Table, combined the stations, and their results as given above, into four groups, as hereafter described in treating of the observations of wind-force. These are the following:—

TABLE XVII. MONTHLY MEANS OF BAROMETRIC PRESSURE FOR THE FOUR GROUPS OF STATIONS.

| | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North-east, . . | 1·575 | 2·005 | 1·732 | 1·925 | 2·111 | 1·995 | 1·879 | 2·035 | 2·226 | 1·817 | 2·040 | 2·201 | 1·962 |
| North-west, . . | 1·475 | 1·970 | 1·715 | 1·908 | 2·120 | 1·992 | 1·897 | 2·012 | 2·200 | 1·801 | 2·095 | 2·186 | 1·948 |
| South-east, . . | 1·600 | 2·007 | 1·748 | 1·900 | 2·104 | 2·016 | 1·888 | 2·048 | 2·226 | 1·862 | 2·063 | 2·240 | 1·975 |
| South-west, . . | 1 556 | 1·971 | 1·764 | 1·879 | 2·108 | 2·012 | 1·902 | 2·028 | 2·206 | 1·879 | 2·146 | 2·233 | 1·974 |

The phenomena of the distribution of pressure are very clearly shown in the foregoing Table. It will be seen from it that, on the average of the entire year, there is an *excess of pressure in the south* of the island, and a defect in the north, the *minimum* being at the *north-western* extremity. This excess of pressure in the south is likewise shown in the means for the seasons of summer, autumn, and winter, respectively; and the cause of it will, I think, hereafter appear upon the discussion of the phenomena of storms. In the separate months, the points of greatest and least pressure vary somewhat irregularly; but they are, in almost every month, at opposite extremities of the island. Thus, in January, the *maximum* pressure is in the *south-east*, and the *minimum* in the *north-west;* and so for the others. This circumstance is what should have been expected *à priori;* and it affords satisfactory evidence of the general accuracy of the results themselves.

## DIRECTION AND FORCE OF THE WIND.

*Direction of Wind.*—The direction of the wind was observed, at most of the stations, by means of the ordinary wind-vane. Much care was, however, taken, not only in placing these instruments truly in azimuth, but also in selecting positions for them which seemed least exposed to eddies or other local irregularities. At Armagh and Dublin the direction of the wind was recorded continuously, by means of self-registering anemometers.

The following Tables give the number of times, out of 100, in which the wind blew from each of the *eight* points at the several stations; Tables XVIII. and XIX. containing the results for the summer and winter half-years, respectively,

and Table xx. those for the entire year. The winds from the *intermediate* points, when observed, were divided equally between the two adjacent *principal* points:—

TABLE XVIII. FREQUENCY OF THE SEVERAL WINDS (SUMMER).

| Station. | N. | N. E. | E. | S. E. | S. | S. W. | W. | N. W. |
|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 20 | 5 | 6 | 6 | 24 | 15 | 11 | 13 |
| Buncrana, . . . | 13 | 8 | 6 | 12 | 11 | 19 | 12 | 19 |
| Donaghadee, . . | 23 | 6 | 5 | 13 | 11 | 14 | 16 | 11 |
| Killybegs, . . . | 15 | 9 | 14 | 7 | 8 | 13 | 21 | 14 |
| Armagh, . . . . | 12 | 9 | 7 | 6 | 16 | 19 | 18 | 15 |
| Killough, . . . | 11 | 7 | 14 | 12 | 16 | 18 | 8 | 14 |
| Markree, . . . . | 14 | 5 | 4 | 17 | 14 | 15 | 10 | 21 |
| Westport, . . . | 10 | 10 | 14 | 10 | 3 | 3 | 32 | 19 |
| Dublin, . . . . | 2 | 10 | 12 | 13 | 8 | 23 | 11 | 19 |
| Portarlington, . | 5 | 28 | 2 | 11 | 7 | 14 | 13 | 21 |
| Athy, . . . . . | 13 | 1 | 2 | 12 | 16 | 12 | 25 | 19 |
| Courtown, . . . | 13 | 17 | 5 | 7 | 8 | 23 | 15 | 13 |
| Kilrush, . . . . | 12 | 10 | 14 | 8 | 8 | 13 | 19 | 17 |
| Dunmore, . . . | 15 | 8 | 14 | 5 | 7 | 18 | 8 | 16 |
| Cahirciveen. . . | 11 | 9 | 12 | 9 | 12 | 18 | 16 | 14 |
| Castletownsend, | 8 | 9 | 11 | 12 | 2 | 37 | 15 | 6 |

TABLE XIX. FREQUENCY OF THE SEVERAL WINDS (WINTER).

| Station. | N. | N. E. | E. | S. E. | S. | S. W. | W. | N. W. |
|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 15 | 3 | 4 | 7 | 35 | 23 | 9 | 4 |
| Buncrana, . . . | 10 | 5 | 5 | 10 | 15 | 27 | 15 | 13 |
| Donaghadee, . . | 9 | 7 | 4 | 7 | 14 | 25 | 26 | 9 |
| Killybegs, . . . | 11 | 6 | 8 | 9 | 13 | 19 | 18 | 15 |
| Armagh, . . . . | 6 | 5 | 2 | 5 | 26 | 35 | 12 | 10 |
| Killough, . . . | 9 | 4 | 4 | 5 | 18 | 25 | 12 | 24 |
| Markree, . . . . | 12 | 4 | 4 | 19 | 19 | 23 | 9 | 10 |
| Westport, . . . | 13 | 4 | 12 | 10 | 6 | 8 | 26 | 21 |
| Dublin, . . . . . | 2 | 1 | 2 | 14 | 14 | 38 | 14 | 13 |
| Portarlington, . | 5 | 11 | 1 | 4 | 10 | 19 | 20 | 30 |
| Athy, . . . . . | 7 | 2 | 1 | 15 | 28 | 11 | 23 | 13 |
| Courtown, . . . | 7 | 5 | 4 | 4 | 18 | 23 | 24 | 16 |
| Kilrush, . . . . | 10 | 9 | 10 | 6 | 16 | 23 | 13 | 14 |
| Dunmore, . . . | 16 | 4 | 3 | 5 | 14 | 20 | 22 | 16 |
| Cahirciveen, . . | 8 | 8 | 13 | 12 | 12 | 20 | 17 | 10 |
| Castletownsend, | 13 | 5 | 3 | 6 | 5 | 35 | 21 | 13 |

TABLE XX. FREQUENCY OF THE SEVERAL WINDS (YEAR).

| Station. | N. | N. E | E. | S. E. | S. | S. W. | W. | N. W. |
|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 17 | 4 | 5 | 6 | 30 | 19 | 10 | 8 |
| Buncrana, . . . | 12 | 7 | 6 | 11 | 13 | 23 | 14 | 16 |
| Donaghadee, . . | 16 | 7 | 4 | 10 | 13 | 19 | 21 | 10 |
| Killybegs, . . . | 13 | 8 | 11 | 8 | 10 | 16 | 20 | 15 |
| Armagh, . . . . | 9 | 7 | 4 | 5 | 21 | 27 | 15 | 12 |
| Killough, . . . | 10 | 5 | 9 | 8 | 17 | 21 | 10 | 19 |
| Markree, . . . . | 13 | 4 | 4 | 18 | 17 | 19 | 10 | 16 |
| Westport, . . . | 11 | 7 | 13 | 10 | 4 | 5 | 29 | 20 |
| Dublin, . . . . | 2 | 6 | 7 | 14 | 11 | 31 | 13 | 16 |
| Portarlington, . | 5 | 19 | 1 | 7 | 9 | 16 | 16 | 25 |
| Athy, . . . . . | 10 | 2 | 1 | 13 | 22 | 12 | 24 | 16 |
| Courtown, . . . | 10 | 11 | 4 | 6 | 13 | 23 | 19 | 14 |
| Kilrush, . . . . | 11 | 9 | 12 | 7 | 12 | 18 | 16 | 16 |
| Dunmore, . . . | 15 | 6 | 9 | 5 | 11 | 19 | 20 | 16 |
| Cahirciveen, . . | 9 | 8 | 13 | 10 | 12 | 19 | 17 | 12 |
| Castletownsend, | 10 | 7 | 7 | 9 | 3 | 36 | 18 | 9 |

The following are the *mean* results for the *whole island*:—

| | N. | N. E. | E. | S. E. | S. | S. W. | W. | N. W. |
|---|---|---|---|---|---|---|---|---|
| Summer, . . . | 12·3, | 9·4, | 8·9, | 10·0, | 10·7, | 17·1, | 16·3, | 15·7. |
| Winter, . . . | 9·6, | 5·2, | 5·0, | 8·6, | 16·4, | 23·4, | 17·6, | 14·4. |
| Year, . . . . | 10·8, | 7·3, | 6·9, | 9·2, | 13·6, | 20·2, | 17·0, | 15·0. |

We learn from them that, in the year 1851, the wind blew, on the average of the entire year, most frequently from between S. W. and W., and least frequently from between N. E. and E. The same thing holds also for the summer half-year, the point of maximum frequency being, very nearly, W. S. W., and that of minimum frequency E. N. E. In the winter half-year the point of maximum frequency is more nearly S. W., that of the minimum being as before. The ratio of the numbers representing the greatest and least frequency is greater in winter than in summer.

It is not necessary to enter more minutely into the discussion of the numbers of the preceding Tables, as it is probable that the results of a single year, as to the frequency of the several winds, will deviate considerably from the means of several. I may observe, however, that they afford some indications of a law

of distribution, depending upon the aspect of the coast. Thus, on comparing the numbers denoting the frequency of any particular wind at the several stations, with their mean for the whole island, it would seem that easterly winds are slightly in excess on the western coast, and westerly winds on the eastern. In other words, there appears to be a preponderating tendency of the wind to blow *from the land*, at each place, as compared with the mean of all. It will remain for future inquiry to ascertain whether this holds good in other years, and is, therefore, to be referred to a general law. If so, it is probably the effect of the land and sea breezes, the former preponderating in the average of the winds at 9 A.M. and 9 P.M.

*Pressure of the Wind.*—For the measurement of the pressure of the wind, a Lind's anemometer was furnished to each station. The difficulty of obtaining accurate results with this little instrument arise, partly, from the smallness of its indications, and, partly, from the oscillations of the fluid in the tube; the latter are so considerable as to render the instrument of little value, except in the hands of a patient and somewhat practised oberver. After some trial, accordingly, it was deemed advisable that the force of the wind should be in all cases *estimated*, and that the use of Lind's anemometer should be limited to that of furnishing a check upon this estimation in the case of the stronger winds.

The first thing to be determined, then, was the choice of a scale of force. The scales in use are various: in one of them there are *four* degrees of wind-force; in another, *six;* and in a third (the Admiralty scale) there are *twelve*. The last of these appears to be too minute for the ordinary powers of unaided estimation, and the first not sufficiently so. The intermediate scale (from 0 to 6), was accordingly adopted; and it appears to be further recommended by the circumstances,—1, that it is the subdivision most generally used on the Continent; and 2, that, as its numbers represent the same degrees of wind-force with the alternate numbers of the Admiralty scale, the latter are convertible into the former by simply dividing by two. The six degrees of wind-force were designated as follow:—1. *Light breeze;* 2. *Moderate breeze;* 3. *Strong breeze;* 4. *Moderate gale;* 5. *Strong gale;* 6. *Storm.*

In order to know the amount of confidence which may be placed in such observations, it is necessary to determine how far, in respect of accuracy, six degrees of wind-force can be estimated, the observations being supposed to be made by practised observers. And to be able to apply the observations, we must further know, what are the pressures and velocities of the wind corresponding to the several terms of the scale. For these purposes I made a somewhat extended series of observations, estimating the force of the wind according to the prescribed scale, and, at the same time, measuring its velocity by means of Robinson's anemometer. The following Table gives the mean results of these observations. The numbers in the first column are the terms of the scale; those in the second are the corresponding times of 100 revolutions of the instrument, expressed in seconds;* the third column contains the corresponding velocities of the wind, in feet per second; and the fourth the calculated velocities, deduced as hereafter described.

TABLE XXI. VELOCITIES OF THE WIND CORRESPONDING TO THE TERMS OF THE SCALE (0 – 6).

| $n$ | $T$ | $V$ (observed). | $V$ (calculated). |
|---|---|---|---|
| I. | 71 | 12 | 12 |
| II. | 35 | 25 | 23 |
| III. | 25 | 35 | 35 |
| IV. | 20 | 43 | 46 |
| V. | 16·8 | 51 | 58 |
| VI. | 11·6 | 75 | 70 |

* Dr. ROBINSON has shown (Transactions, vol. xxii. p. 167), that the velocity of the wind is to that of the centres of the hemispherical cups, as 3 to 1. But $r$ being the length of the horizontal arms of the instrument, measured to these centres, the circumference of the circle described by them is $2\pi r$; and if $r$ be expressed in feet, and $n$ be the number of revolutions performed in a second, their velocity is $2\pi r \times n$. The corresponding velocity of the wind therefore is $V = 6\pi r \times n$. In the instrument in my possession, the radius is 5·5 inches. Hence $2r = \frac{11}{12}$, and substituting for $\pi$ its numerical value, $V = 8{\cdot}64 \times n$.

Instead of noting the number of revolutions, and parts of a revolution, performed in a given time, I have found it convenient to observe the *time* of performing 100 revolutions. I have had

We see that the terms of the estimated scale correspond, nearly, to an arithmetical progression of *velocities*, and not of *pressures*. This fact has been already noticed by Dr. ROBINSON.

The common difference in this series, which is equal to its first term, is obtained from the numbers of the third column by means of the formula $V = nV_1$. The following are the deduced values:—

| | | | |
|---|---|---|---|
| I. | $V_1 = 12{\cdot}0$ | IV. | $V_1 = 10{\cdot}8$ |
| II. | $12{\cdot}5$ | V. | $10{\cdot}2$ |
| III. | $11{\cdot}7$ | VI. | $12{\cdot}5$ |

The mean of these values is $V_1 = 11{\cdot}6$. The calculated values of $V$, contained in the last column of the foregoing Table, are, accordingly, obtained from the formula

$$V = 11{\cdot}6 \times n;$$

their agreement with the *observed* values is sufficient to establish the assumed law.

As a verification of the preceding result, I took also a tolerably extended series of measurements of the *pressures* of the wind, corresponding to the highest term of the scale, with Lind's anemometer. Their mean gave 2·06 inches for the reading of the instrument corresponding to that term; and the corresponding pressure on one square foot of surface, computed in the proportion of 5·20 pounds to the inch, is 10·7 pounds. Hence, the pressure belonging to the unit of the scale is $P_1 = 0{\cdot}30$. The corresponding velocity is inferred from the formula $V^2 = 437\,P$. Its value is $V_1 = 11{\cdot}5$; a result which agrees very closely with that already deduced from ROBINSON'S anemometer.

The results hitherto given rest only on my own estimations; it remains

the instrument accordingly provided with a little hammer, which is pressed against the registering wheel by a spring, and which, being raised by a projecting pin at one point of its circumference, falls again with a sharp noise when this has passed. The interval between two such strokes of the hammer, therefore, is the time of one whole revolution of the registering wheel, or of 100 revolutions of the arms. Accordingly, a chronometer being held close to the ear, the whole observation is effected by the help of that organ. The velocity of the wind in this case is given by the formula $V = \frac{864}{T}$, $T$ being the observed time of 100 revolutions.

to see how far they accord with those of other observers. I have selected for this purpose the results of the observations with Lind's anemometer, made at Portrush and Donaghadee by two of the best of the coast-guard observers, and have placed my own beside them, for comparison. The results, converted into pressures (expressed in pounds on the square foot), are contained in the following Table. The numbers in the last column are the *calculated* pressures, deduced from the formula

$$P = P_1 n^2,$$

$n$ being the number of the term of the scale, and $P_1$ (= 0·30) the pressure corresponding to the first term.

TABLE XXII. OBSERVATIONS OF THE PRESSURES OF THE WIND CORRESPONDING TO THE TERMS OF THE SCALE (0 – 6).

| Term. | Dublin. | Portrush. | Donaghadee. | Calculated. |
|---|---|---|---|---|
| I. | 0·5 | 0·4 | 0·5 | 0·3 |
| II. | 1·3 | 1·3 | 1·1 | 1·2 |
| III. | 3·0 | 2·9 | 2·9 | 2·7 |
| IV. | 4·2 | 5·3 | 5·3 | 4·8 |
| V. | 7·0 | 7·3 | 7·9 | 7·5 |
| VI. | 10·7 | — | — | 10·8 |

It will be seen, that the differences of the corresponding numbers at the three stations are small, and that their means agree very well with the calculated pressures. It seems therefore to be fully proved, that the velocity of the wind may be estimated to six degrees, by practised observers, with sufficient accuracy.

The following Table contains the monthly means of the observed wind-force, in the terms of the prescribed scale. At Buncrana and Westport the force appears to have been over-estimated; at the other stations it seems to have been correctly observed:—

TABLE XXIII. MONTHLY MEANS OF THE FORCE OF THE WIND.

| Station. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 2·0 | 1·7 | 2·0 | 1·7 | 1·7 | 2·0 | 1·7 | 1·7 | 1·3 | 1·9 | 1·8 | 1·7 |
| Buncrana, . . . | 2·5 | 2·0 | 2·2 | 2·3 | 2·2 | 2·4 | 2·0 | 2·1 | 1·9 | 2·3 | 1·8 | 2·1 |
| Donaghadee, . . | 2·2 | 1·7 | 1·8 | 1·7 | 1·6 | 1·5 | 1·6 | 1·3 | 1·3 | 1·8 | 2·0 | 1·4 |
| Killybegs, . . . | 1·9 | 1·2 | 1·8 | 1·1 | 1·5 | 1·7 | 1·3 | 1·4 | 1·4 | 2·2 | 1·5 | 1·9 |
| Armagh, . . . . | 2·6 | 1·9 | 1·7 | 1·5 | 1·3 | 1·4 | 1·1 | 1·1 | 1·0 | 1·6 | 1·1 | 1·8 |
| Killough, . . . . | 2·2 | 1·4 | 1·6 | 1·4 | 1·2 | 1·9 | 1·7 | 1·9 | 1·5 | 2·2 | 1·8 | 2·3 |
| Markree, . . . . | 2·0 | 1·6 | 2·1 | 1·5 | 1·7 | 1·9 | 1·9 | 1·5 | 1·6 | 1·9 | 1·6 | 1·7 |
| Westport, . . . | 3·9 | 2·4 | 2·7 | 2·1 | 2·2 | 2·5 | 2·4 | 2·2 | 1·8 | 3·0 | 2·2 | 2·5 |
| Dublin, . . . . . | 1·9 | 1·3 | 1·3 | 1·3 | 1·4 | 1·7 | 1·6 | 1·0 | 1·0 | 1·4 | 1·1 | 0·9 |
| Portarlington, . | 1·3 | 1·3 | 1·2 | 1·3 | 1·2 | 2·0 | 1·4 | 1·4 | 1·2 | 1·7 | 1·1 | 1·0 |
| Athy, . . . . . | 1·3 | 1·1 | 1·5 | 1·4 | 1·7 | 1·5 | 1·7 | 1·5 | 0·7 | 1·3 | 1·0 | 1·0 |
| Courtown, . . . | 1·9 | 1·7 | 1·5 | 1·5 | 1·4 | 1·4 | 1·2 | 1·5 | 1·4 | 1·5 | 1·8 | 1·8 |
| Kilrush, . . . . | 2·7 | 1·9 | 2·0 | 1·6 | 1·6 | 2·0 | 1·9 | 1·7 | 1·5 | 2·2 | 1·6 | 1·7 |
| Dunmore, . . . | 2·5 | 2·0 | 1·9 | 1·9 | 1·8 | 2·0 | 1·9 | 1·9 | 1·8 | 2·0 | 1·7 | 2·1 |
| Cahirciveen, . . | 2·8 | 1·9 | 2·1 | 1·8 | 1·8 | 2·1 | 1·8 | 1·9 | 1·4 | 2·2 | 1·8 | 2·2 |
| Castletownsend, | 2·9 | 2·2 | 2·4 | 2·3 | 1·7 | 2·1 | 1·7 | 2·1 | 1·7 | 2·5 | 1·7 | 2·6 |
| Means, . . | 2·29 | 1·71 | 1·86 | 1·65 | 1·63 | 1·88 | 1·68 | 1·64 | 1·41 | 1·98 | 1·60 | 1·79 |

The lowest line of the preceding Table contains the mean results of all the stations, or the average forces of the wind in the several months for the whole island. The mean force for the entire year is 1·76, corresponding to a velocity of 20·4 feet per second. The force is, of course, greater in winter than in summer, the mean force for the winter half-year being 1·87, and that for the summer half-year 1·65. The law of the annual progression is, however, greatly masked by irregularities; thus, the minimum force for the year 1851 occurs in the month of September, while the force in June is above the average of the entire year.

In the following Table are given the results of the preceding for the entire year, and for its two principal divisions. The excess of the force in winter appears at all the stations, excepting Dublin, Portarlington, and Athy.* At these three stations, also, the force of the wind is much *below* the average.

* Buncrana is likewise an exceptional case; but the exception is there probably due to inaccuracy of observation.

TABLE XXIV. MEAN FORCE OF THE WIND FOR THE SUMMER AND WINTER HALF-YEARS, AND FOR THE WHOLE YEAR.

| Station. | Summer. | Winter. | Year. |
|---|---|---|---|
| Portrush, . . . . . | 1·68 | 1·85 | 1·77 |
| Buncrana, . . . . | 2·15 | 2·15 | 2·15 |
| Donaghadee, . . . | 1·50 | 1·82 | 1·66 |
| Killybegs, . . . . | 1·40 | 1·75 | 1·58 |
| Armagh, . . . . . | 1·23 | 1·78 | 1·51 |
| Killough, . . . . . | 1·60 | 1·92 | 1·76 |
| Markree, . . . . . | 1·68 | 1·82 | 1·75 |
| Westport, . . . . | 2·20 | 2·78 | 2·49 |
| Dublin, . . . . . | 1·33 | 1·32 | 1·33 |
| Portarlington, . . | 1·42 | 1·27 | 1·34 |
| Athy, . . . . . | 1·42 | 1·20 | 1·31 |
| Courtown, . . . . | 1·40 | 1·70 | 1·55 |
| Kilrush, . . . . . | 1·72 | 2·02 | 1·87 |
| Dunmore, . . . . | 1·88 | 2·03 | 1·96 |
| Cahirciveen, . . . | 1·80 | 2·17 | 1·98 |
| Castletownsend, . | 1·93 | 2·38 | 2·16 |

If, to eliminate local irregularities, we combine the preceding results in groups, according to the arrangement hereafter described, we find the following values for the mean forces of the entire year:

| | | | |
|---|---|---|---|
| North-east, . . . | 1·64 | North-west, . . . | 1·94 |
| South-east, . . . | 1·61 | South-west, . . . | 2·00 |

From this it appears that the mean force of the wind is considerably greater in the *west* of the island than in the *east*, the ratio being somewhat greater than that of 1·2 to 1. There is but little difference between the forces in the northern and southern portions of the island.

## CYCLONIC MOVEMENTS.

In analyzing the phenomena of rotation, the first step was to note those cases in which the mean directions of the wind, in any two districts, differed by 90°, or upwards. It was soon perceived, that no conclusion could be drawn as to a general movement of the atmosphere, when the wind was very moderate, the direction being then greatly influenced by local causes. Accordingly, excluding those cases in which the wind did not exceed a light breeze at most of the stations, the remainder were examined in detail, by laying down the

simultaneous directions of the wind upon a series of skeleton charts prepared for the purpose; and there was no difficulty in ascertaining, by the inspection of these charts, the existence or non-existence of rotatory movement. The same means sufficed to determine, very nearly, the position of the centre of the vortex at each epoch; and the places of the centre being thus found, for epochs distant by intervals of twelve hours, the direction and velocity of its progressive movement are ascertained.

The position of the centre of the vortex at any instant may be determined, more accurately, by calculation. Thus, if $y$ and $x$ denote the distances (in geographical miles) of the place of observation from any assumed central point, measured on the meridian, and on the perpendicular to the meridian, respectively; $y_0$ and $x_0$ the corresponding co-ordinates of the centre of the vortex; and $\theta$ the angle which the direction of the wind at the point $(y, x)$ makes with the meridian, measuring from north to east;

$$y - y_0 + (x - x_0) \tan \theta = 0,$$

the direction of the wind being perpendicular to the line connecting the points $(y, x)$ and $(y_0, x_0)$. Now, all the quantities in this equation are given, excepting $y_0$ and $x_0$; so that, if the direction of the wind be accurately known at two stations, the co-ordinates of the centre of the vortex may be completely determined. The irregularities due to local causes, and the errors of observation themselves, forbid this; and, in order to lessen their influence, it is necessary to know the direction of the wind at several stations. There will then be as many equations of the preceding form, as there are places of observation; and the unknown quantities, $y_0$ and $x_0$, are to be determined by combining these equations by the method of least squares.

It is found, that the centre of the vortex is also the point of *least barometric pressure*, and that the pressure increases regularly with the distance from it. Hence the position of the centre may be inferred from the barometric observations alone. The positions thus determined have been found to coincide in all cases, very nearly, with those deduced from the observed directions of the wind.

The following are the well-marked instances of aerial rotation which have occurred in Ireland in the course of these observations. No case has been included in the enumeration, in which the simultaneous directions of the wind did not differ, at two points, by at least 90°; and thus, probably, many cases

of cyclonic movement are passed over, in which the centre of the vortex was remote. The observations themselves are given in detail in Table XXXIII., at the end of this Paper.* The following are their principal results:—

1850. Oct. 6, 7.—Cyclone and storm, moving from S.W. to N.E., with a velocity of about 290 geographical miles *per diem*. (Plate VIII. Figs. 1, 2, 3.)

Oct. 6, 9 A. M.—Centre of the vortex on the south-western coast of Ireland, west of Kilrush. Least pressure at Cahirciveen. Mean velocity of the wind = 25 feet per second; greatest do. (on the west coast) = 45 feet. The atmosphere at the northern stations unaffected by the vortex at this epoch.

Oct. 6, 9 P. M.—Centre of the vortex over the north of Ireland, a few miles north of Killybegs. Absolute barometric minimum (= 28·836) at Killybegs; increase of pressure in 100 miles = 0·30 inch. Mean velocity of wind = 35 feet per second; greatest do. (Markree) = 70. Southern stations unaffected by the vortex.

Oct. 7, 9 A. M.—Centre on south-western coast of Scotland. Least pressure at Donaghadee. Mean velocity of wind = 45 feet per second; greatest do. (north coast) = 60 feet. Hail fell at Markree; wind amounting to a gale in the north, in the evening of the same day.

The diameter of the vortex may be estimated with tolerable precision in this case, by measuring from the centre to the limits of the region affected by the movement; it was about 280 geographical miles.

Oct. 22, 23.—An interesting and instructive case of conflicting currents generating a rotatory movement. The velocity of the wind was uniform throughout the island, and was from 30 to 35 feet per second. (Plate VIII. Figs. 4, 5, 6.)

Oct. 22, 9 P. M.—Wind from N. W. in the north of Ireland, and from S. W. in the south-east. The central point of junction of these currents was over the channel, to the north-east of Dublin. Least pressure at Donaghadee.

* It seems certain that a careful study of the *simultaneous* atmospheric phenomena, even in a limited district, will throw more light upon the "law of storms," than any other mode of inquiry; and for this reason, as well as for the authentication of my own inferences, I have thought it right to give these observations *in extenso*. It is probable that an attentive examination of them may elicit many conclusions which have escaped my notice.

Oct. 23, 9 A. M.—A distinct rotatory movement, whose centre was a little to the north-east of the point of junction above referred to, not far from Donaghadee. Least pressure at Donaghadee, as before.

Oct. 23, 9 P. M.—Rotatory movement continued. Centre of vortex had moved from S. W. to N. E., at the rate of about 100 miles *per diem.* Absolute minimum of pressure (= 29·360) at Donaghadee; increase of pressure in 100 miles = 0·10 inch.

Nov. 18, 19.—A cyclone, with violent storm, crossing the island from W. S. W. to E. N. E. (Plate IX. Figs. 1, 2, 3.) The movement of the centre of the vortex appears to have been curvilinear, and to have varied considerably in velocity. Between 9 P. M. of the 18th, and 9 A. M. of the following day, its path was from S. W. to N. E., and its velocity about 320 miles *per diem;* in the succeeding twelve hours its course was nearly from W. to E., with a greatly diminished velocity. The mean velocity of the wind, throughout the storm, was from 45 to 50 feet per second.

Nov. 18, 9 P. M.—Centre of the vortex on the south-western coast, about 30 miles to the north of Cahirciveen. Least pressure at Kilrush. Maximum velocity of wind (in south of island) = 60 feet per second.

Nov. 19, 9 A. M.—At this epoch the wind was blowing from N. at Killybegs, and from S. at Donaghadee; it was blowing from S. E. at Portrush, and from N. W. at Castletownsend; from S. S. E. at Armagh, and from N. N. W. at Markree. The centre of the vortex was therefore over Ireland at that time, and between the stations above mentioned, its exact position being about 15 miles to the west of Armagh. Absolute minimum of pressure (= 28·248) at Armagh; increase of pressure = 0·31 inch. Maximum velocity of wind (in south) = 65 feet per second.

Nov. 19, 9 P. M.—Centre over the Channel, to the south-east of Donaghadee. Absolute minimum of pressure (= 28·410) at Donaghadee; increase of pressure = 0·28 inch. Maximum velocity of wind (in south) = 55 feet per second.

We have seen that the centre of the vortex was between Armagh and Markree at 9 A. M. of the 19th; and, as the direction of its progressive movement was not far from the line connecting these places, it must have passed nearly centrally over both. Hence we should expect there the peculiar phe-

nomena—the *lull* of the wind, and the *sudden reversal* of its direction—which are observed to occur at places in the path of the centre of a cyclone. I shall therefore briefly describe the series of changes at these two stations. The observations at Armagh are taken from the records of the self-registering anemometer, which were, of course, *continuous;* those at Markree were made at short intervals.

At Armagh the wind began to blow at 7 P. M. of the 18th, with a velocity of 32 feet per second. The maximum velocity, with the exception of a short squall* at 5 A. M., occurred at 7 A. M. of the 19th, and amounted to 43 feet per second. From this time the wind abated rapidly *almost to a calm*, its velocity at noon amounting only to 6 feet per second; but at 3 P.M. it rose again, with a velocity of 22 feet. The initial direction of the gale was from the E. S. E. From 9 P. M. on the 18th, to 1 A.M. on the 19th, it veered to S., at which point it continued for several hours, including the period of greatest force of the gale. At 11 A. M. its direction had returned to S. E., and it then *suddenly shifted* to W. N. W., altering through 160° in 24 minutes. The minimum of pressure took place at $11^{h}\cdot 30^{m}\cdot$, at the close of this movement; its amount was 27·930 inches.†

* During the squall, which lasted only three minutes, the velocity reached 90 feet per second.

† The following are the anemometric observations above referred to. The direction is measured from S. through W. to N.; the velocity is expressed in miles per hour. On the 19th, from 4 A. M. to 8 A. M., the direction-registering pencil was thrown out of gear, but there appears to have been no change of any magnitude in the interval:

| | Nov. 18 A. M. | | Nov. 18 P. M. | | Nov. 19 A. M. | | Nov. 19 P. M. | |
|---|---|---|---|---|---|---|---|---|
| Hour. | Vel. | Dir. | Vel. | Dir. | Vel. | Dir. | Vel. | Dir. |
| 0 | 12·2 | 28°·8 | 4·8 | 212°·3 | 23·4 | 335°·2 | 4·1 | 124°·0 |
| 1 | 8·3 | 28 ·2 | 5·3 | 243 ·6 | 24·4 | 354 ·3 | 10·5 | 104 ·4 |
| 2 | 5·9 | 47 ·8 | 8·7 | 276 ·2 | 22·2 | 353 ·4 | 12·0 | 93 ·9 |
| 3 | 7·2 | 49 ·8 | 7·8 | 274 ·5 | 23·6 | 345 ·6 | 15·4 | 90 ·2 |
| 4 | 8·1 | 48 ·1 | 14·7 | 278 ·8 | 23·2 | — | 16·9 | 108 ·8 |
| 5 | 3·8 | 41 ·3 | 16·1 | 281 ·7 | 25·3 | — | 13·8 | 136 ·7 |
| 6 | 2·9 | 75 ·0 | 16·6 | 281 ·9 | 27·4 | — | 15·1 | 138 ·3 |
| 7 | 3·7 | 162 ·3 | 22·0 | 283 ·5 | 29·4 | — | 16·2 | 151 ·1 |
| 8 | 1·5 | 162 ·0 | 19·2 | 285 ·5 | 29·0 | — | 16·6 | 153 ·6 |
| 9 | 2·3 | 212 ·4 | 19·3 | 282 ·1 | 17·6 | 339 ·8 | 15·8 | 151 ·2 |
| 10 | 4·9 | 205 ·4 | 17·6 | 321 ·3 | 14·6 | 320 ·6 | 9·2 | 147 ·5 |
| 11 | 5·9 | 209 ·2 | 20·1 | 330 ·6 | 7·6 | 324 ·5 | 11·8 | 159 ·5 |

At Markree the gale commenced at $4^h \cdot 30^m \cdot$ P. M. of the 18th, with a rapidly falling barometer. At 7 P. M. the wind abated to a breeze, the barometer still falling. It recommenced at 10 P. M. from the S. E.; and at 3 A. M. on the 19th it appears to have attained its maximum. At 6 A. M. the wind again abated; and at 7 A. M. *there was a calm.* The minimum pressure took place at this time, and amounted to 28·170 inches. At 9 A. M. the wind rose again from the N. N. W., but not with such force as before; and in the afternoon there was a strong gale again.*

From these facts it is evident, that the centre of the vortex passed nearly over Markree at 7 A. M., and over Armagh at $11^h \cdot 30^m \cdot$ A. M. At Donaghadee, which is nearly in the prolongation of the line connecting the two former places, the wind ceased at 1 P. M., and recommenced at 5 P. M.; so that the vortex passed nearly centrally over this station at about 3 P. M. From these data we learn that the cyclone moved from W. S. W. to E. N. E.; and that the velocity of the progressive movement was then about 12 miles per hour.

* The following are the extra observations at Markree above referred to. Reduction of barometer to sea-level = + 0·161 inch:—

| Date. | Hour. | Bar. | Therm. | Remarks. |
|---|---|---|---|---|
| Nov. 18, | $4^h \cdot 30^m \cdot$ | 1·124 | 46°·8 | Blowing a gale; storm and rain began about noon. |
| | 6 | 1·002 | 48 ·8 | Ditto; rain. |
| | 7 | 0·926 | 49 ·5 | Strong breeze; heavy rain. |
| | 8 | 0·835 | 50 ·5 | Ditto; ditto. |
| | 10 | 0·652 | 53 ·7 | Gale. |
| | 11 | 0·577 | 54 ·0 | Wind rising to gale; mizzling rain. |
| | 12 | 0·538 | 52 ·5 | Strong breeze; ditto. |
| Nov. 19, | 3 A. M. | 0·315 | 50 ·5 | Wind higher than at any previous time. |
| | 5 | 0·120 | 46 ·5 | Gale; mizzling rain. |
| | 6 | 0·027 | 45 ·5 | Strong breeze. |
| | 7 | 0·009 | 47 ·3 | Calm. |
| | 8 | 0·023 | 48 ·2 | Light breeze; mizzling rain. |
| | 9 | 0·067 | 45 ·8 | Gale. |
| | 10 | 0·124 | 46 ·0 | Strong breeze; wind N. N. W. |
| | 3 P. M. | 0·303 | 48 ·8 | Strong breeze. |
| | 7 | 0·483 | 49 ·5 | Strong gale. |
| | 10 | 0·533 | 48 ·0 | Gale from N. W.; light showers. |
| | 11 30 | 0·578 | 49 ·0 | Strong gale. |
| Nov. 20, | 10 A. M. | 1 084 | 48 ·4 | Ditto; showers. |
| | 11 | 1·128 | 48 ·3 | Ditto. |
| | 1 30 | 1·227 | 47 ·5 | Ditto. |
| | 3 | 1·282 | 46 ·5 | Ditto; heavy rain. |
| | 5 | 1·376 | 44 ·8 | Moderate gale. |

The dimensions of the vortex may likewise be collected from the same data. The interval between the commencement of the storm, and the passage of the centre, at Armagh, was 16½ hours; and, the velocity being 12 miles an hour, the radius of the vortex was about 200 miles. The magnitude of the nearly quiescent portion of air in the centre of the vortex is better defined. At Armagh the lull lasted from three to four hours; at Markree three hours; and at Donaghadee four hours. The diameter of the quiescent central portion was, therefore, about 40 miles.

We may now refer to some particulars connected with this gale, which appear to merit attention—although probably, in the present state of knowledge on this subject, we should not be justified in offering any suggestions in explanation.

Among the first of these are the abnormal variations in the rotatory movement, especially along the track of the centre. The most curious of these irregularities is that of the direction. At Armagh this began to change rapidly at 9 P. M. of the 18th. At 9 P. M. it was E. S. E.; at 10 P. M., S. E.; at midnight, S. S. E.; and at 1 A. M. on the 19th, S. At this latter point it remained for several hours; and the direction then *retrograded* through an arc of about 45°. At 9 A. M. on the 19th, it was S. S. E.; and at 11 A. M. it came back to S. E., after which the *sudden* shift to W. N. W., already noticed, took place.

The next point which seems to merit notice is the fact, that the force of the gale was considerably greater to the south of the line of passage of its centre, than on that line itself, or to the north of it. Thus, at Killiney, where I made frequent observations during the gale, I found the maximum velocity to be 80 feet per second; at Armagh it was little more than half that amount.

It has been already mentioned that the greatest force of the storm occurred at Armagh and Markree, *before* the epoch of minimum pressure, the interval at both places being about four hours and a half. A similar interval took place at Killiney, but in the *opposite* direction, the epoch of greatest intensity *following* that of least pressure by four hours and a half.

The last point which appears to demand notice is the fact, that there was a considerable interval between the epochs of the greatest intensity of the storm at Dublin and at Killiney, places only ten miles apart. The greatest

force of the gale, at Dublin, took place between 1 P M. and 2 P.M.; at Killiney it occurred between 5 P.M. and 6 P.M. There is a similar interval between the times of minimum pressure at the two places, the least height of the barometer occurring later at Killiney than at Dublin by two or three hours. These differences are probably connected with the difference of altitude of the places of observation.

1851. Jan. 15, 16.—A remarkable case of a double cyclone with storm, and a double minimum of pressure. (Plate IX. Figs. 4, 5, 6.) The first of the two vortices crossed the island from S. to N. on the 15th, and the second traversed the north-western portion of it, from S.W. to N.E., on the following day. The velocity of the former is not well determined; that of the latter is about 270 miles *per diem*. The mean velocity of the wind was from 30 to 35 feet per second on the former day, and from 55 to 60 on the latter.*

Jan. 15, A. M.—Centre of vortex about 20 or 30 miles south of Dunmore.

* The following extra observations were taken at Markree, January 15, 16. Reduction of barometer to sea-level = 0·161 inch:—

| Date. | Hour. | Bar. | Therm. | Wind. | Cloud. | Remarks. |
|---|---|---|---|---|---|---|
| Jan. 15, | $1^h\cdot 30^m\cdot$ | 0·786 | 42°·1 | N.W. 4 | 10 N | Mizzling rain. |
| | 2 30 | 0·832 | 41 ·5 | N.W. 4 | 10 N | Mizzling rain. |
| | 4 | 0·921 | 40 ·8 | W.N.W. 4 | 10 N | Rain. |
| | 5 | 0·986 | 41 ·5 | W.N.W. 4 | 10 N | Rain. |
| | 6 | 1·040 | 42 ·5 | W.N.W. 4 | 10 N, C K | Clouds breaking all round. |
| | 10 | 1·204 | 37 ·9 | S.W. 2 | 0 0 | Began to clear at $6^h\cdot 30^m\cdot$ |
| | 12 5 | 1·242 | 34 ·4 | S.W. 1 | 3 C | Clouds rapidly rising from south-west. |
| | 12 17 | 1·240 | 34 ·1 | S.W. 1 | | |
| Jan. 16, | 1 A. M. | 1·225 | 34 ·3 | S.W. 1 | 9 C | A large halo round moon. |
| | 8 30 | 0·776 | 42 ·0 | S.E. 5 | 10 N | Mizzling rain. |
| | 9 | 0·751 | 43 ·7 | S.E. 5 | 10 N | |
| | 9 30 | 0·726 | 45 ·5 | S.S.E. 5 | 10 N | |
| | 10 | 0·718 | 47 ·2 | S.S.E. 5 | 10 N | Lind's anemometer = 0·85 inch. |
| | 11 | 0·668 | 49 ·7 | S. 5 | 10 N | Wind not quite as strong as at 10 A. M. |
| | 12 | 0·614 | 50 ·0 | S. 4 | 10 N | Rain; rough, with heavy rain a little [before this time. |
| | 1 P. M. | 0·566 | 51 ·5 | S. 4 | 10 N | |
| | 2 | 0·534 | 50 ·5 | S. 4 | 9 N, K S | Clouds began to break at 1 P. M. |
| | 9 | 0·620 | 46 ·8 | S.W. 5 | 9 N | |
| | 9 30 | 0·661 | 46 ·7 | S.W. 5 | 7 N, K | Gusts very high occasionally. |
| | 10 | 0·715 | 46 ·1 | S·W. 5 | 9 N, C K | Lind's anemometer = 0·80 inch. |
| | 11 | 0·794 | 45 ·2 | S.W. 4 | 8 N, K S | |
| | 11 30 | 0·824 | 44 ·8 | S.W. 5 | 10 N | Rain. |
| | 12 | 0·835 | 43 ·0 | S.W. 4 | 2 K S, C K | |
| Jan. 17, | 1 A. M. | 0·890 | 43 ·5 | S.W. 4 | 1 K | |
| | 2 | 0·920 | 42 ·7 | S.W. | 2 K S, C | |

Absolute minimum of pressure (= 28·718) at Dunmore; increase of pressure = 0·15 inch. Maximum velocity of wind (west coast) = 60 feet per second.

Jan. 15, 9 P. M.—Centre of vortex appears to have been at this time a few miles north of Buncrana; the cyclonic movement was, however, not distinctly marked, probably owing to the influence of the second cyclone. Least pressure at Buncrana. Velocity of wind uniform throughout the island.

Jan. 16, 9 A. M.—Centre of second vortex to the south-west of Westport. Least pressure at Westport.

Jan. 16, 9 P. M.—Centre about 20 miles west of Buncrana. Absolute minimum of pressure (= 28·671) at Buncrana; increase of pressure = 0·20 inch.

Jan. 30, 31.—A very interesting cyclone traversing the western portion of the island, in direction from N. to S. nearly, at the rate of about 150 miles *per diem*. The wind light, the mean velocity being about 20 feet per second.

Jan. 30, 9 P. M.—Centre of vortex over north-western portion of island, a little to the north of Killybegs. Least pressure at Killybegs. Maximum velocity of wind (in south-west) = 40 feet per second.

Jan. 31, 9 A. M.—Centre a little to the eastward of Westport. Absolute minimum of pressure (= 29·032) at Westport; increase of pressure = 0·10 inch. Maximum velocity of wind (in south-west) = 25 feet per second. Lightning observed in north in evening of this day and day preceding.

March 18.—A cyclone, with storm, traversing the island from S. to N., at the rate of about 200 miles *per diem*.*

* The following extra observations were taken at Markree, March 18, 1851:—

| Date. | Hour. | Bar. | Therm. | Wind. | Cloud. | Remarks. |
|---|---|---|---|---|---|---|
| March 18, | 7 A. M. | 1·150 | 41°·9 | S. E. 4 | 10 N | 100 rev. in 29″·; pouring rain. |
| | 8 | 1·128 | 43 ·5 | S. S. W. 4 | 10 N | 100 rev. in 42″·; light rain. |
| | 9 | 1·148 | 46 ·5 | S. W. 3 | 9 N | |
| | 10 | 1·170 | 46 ·0 | S. W. 3 | 9 N, C S | 100 rev. in 60″·; a shower. |
| | 11 | 1·176 | 47 ·5 | S. W. 4 | 6 N, K | 100 rev. in 36″·; intermittent sunshine. |
| | 12 | 1·193 | 47 ·3 | S. W. 4 | 10 N | Rain. |
| | 4 30 | 1·238 | 45 ·5 | S. W. 5 | 10 N | 100 rev. in 22″·; rain; blows a strong gale when raining, but a moderate gale between showers. |
| | 6 | 1·266 | 42 ·0 | S. W. 4 | 9 N | |

March 18, 9 A. M.—Centre of vortex near Markree. Absolute minimum of pressure (= 29·328) at Armagh; increase of pressure = 0·10. Mean velocity of the wind = 45 feet per second; greatest do. (west coast) = 50 feet.

March 18, 9 P. M.—Centre of vortex north of the island. Absolute minimum of pressure (= 29·371) at Portrush; increase of pressure = 0·13 inch. Mean velocity of the wind = 35 feet per second; greatest do. (north-west) = 50 feet.

March 19, 9 A. M.—Rotatory movement broken up, and wind lessened. Barometer fell, and wind rose again to a gale in the evening; greatest velocity (north-west) = 65 feet per second.

March 25.—A distinct rotatory movement at 9 A. M. of this day, the centre of which was a little to the north of Westport. Absolute minimum of pressure (= 29·408) at Westport; increase of pressure = 0·13 inch. The velocity of wind uniform, and about 30 feet per second. The wind was very light at the preceding and subsequent observations, so that the progressive movement of the vortex cannot be traced.

June 11, 12.—Cyclone crossing the island from S. W. to N. E., with a velocity of about 260 miles *per diem.*

June 11, 9 P. M.—Centre of the vortex a little to the west of Cahirciveen. Least pressure at Cahirciveen. Mean velocity of wind = 40 feet per second.

June 12, 9 A. M.—Centre over the island, between Kilrush and Westport. Absolute minimum of pressure (= 29·347) at Kilrush; increase of pressure = 0·04 inch. Mean velocity of wind = 25 feet per second.

June 12, 9 P. M.—Centre over the channel, to the east of Killough. Least pressure at Dublin. Mean velocity of wind = 20 feet per second.

July 27, 28.—Cyclone traversing the western coast, in direction from S. S. W. to N. N. E. Velocity of wind = 30 feet per second.

July 27, 9 A. M.—Centre of vortex west of Cahirciveen. Least pressure at Cahirciveen. Greatest velocity of wind in south-west. The wind at the north-eastern stations uninfluenced by the vortex.

July 27, 9 P. M.—Centre south of Westport. Absolute minimum of pressure (= 29·559) at Markree; increase of pressure = 0·10 inch. Velocity of wind uniform.

July 28, 9 A. M.—General current from S.W.; mean velocity = 30 feet per second.

August 23, 24.—Well-defined cyclone advancing in a curvilinear path, the movement of the centre being at first from N. W. to S. E., and afterwards from S. W. to N. E.*

Aug. 23, 9 P. M.—Centre of the vortex north-west of the island. Least pressure at Buncrana. Mean velocity of wind = 25 feet per second. Lightning along the whole of the eastern coast during the day.

Aug. 24, 9 A. M.—Centre near Armagh. Absolute minimum of pressure = 29·439) at Armagh; increase of pressure = 0·13 inch. Mean velocity of wind = 35 per second; greatest do. (south) = 55 feet. The centre of the vortex appears to have passed over Donaghadee about noon. At 9 A. M. the direction of the wind there was E. S. E.; at 12 (noon) W. S. W.; and at $1^{h}\cdot 30^{m}\cdot$ P. M. W. N. W., the shift being accompanied by strong gales and heavy rain.

Aug. 24, 9 P. M.—Centre north-east of the island. Least pressure at Donaghadee. Mean velocity of wind = 25 feet per second.

September 29, 30.—Interesting cyclone and storm, crossing the island from S. S. W. to N. N. E., with a velocity of about 270 miles *per diem*.

* The following extra observations were taken at Donaghadee on this day (August 24). Reduction of barometer to sea-level = + 0·077. The force of the wind is expressed in inches of Lind:—

| | Barometer. | Direction. | Force. | Remarks. |
|---|---|---|---|---|
| Noon, | 1·274 | W. S. W. | 0·1 | Light showers. |
| 1·30 P. M. | . . . | W. N. W. | 1·0 | Squall, with heavy rain. |
| 3·0 | 1·404 | N. N. W. | 2·5 | Rain. |
| 4·0 | 1·504 | W. N. W. | 1·5 | |

(Plate x. Figs. 1, 2, 3.) Mean velocity of wind on the 29th = 45 feet per second.*

Sept. 29, 9 A. M.—Centre of vortex off the south-western coast, to the west of Cahirciveen. Force of wind greatest at the same station at 3 A.M.; but the barometer continued to fall until noon, when the pressure was 28·970. Increase of pressure = 0·22 inch. Greatest velocity of wind (north-west) = 60 feet per second.

Sept. 29, 9 P. M.—Centre over the island, about midway between Kilrush and Dublin. Absolute minimum of pressure (= 29·030) at Markree; increase of pressure = 0·12 inch. Least pressure in south-east at 6 P. M. Greatest velocity of wind (north-east) = 55 feet per second.

Sept. 30, 9 A. M.—Centre near Malin Head, at northern extremity of the island. Absolute minimum of pressure (= 29·020) at Portrush; increase of pressure = 0·15 inch. Mean velocity of wind = 35 feet per second; greatest do. (north-west) = 55 feet.

Sept. 30, Oct. 1.—Cyclone moving apparently in curvilinear path, its course being at first from W. to E., until it reached the centre of the island, and afterwards from S. S. W. to N. N. E. Mean velocity of wind between 25 and 30 feet per second.

* The following extra observations were taken at Markree, Sept. 29, 30, and Oct. 1:—

| Date. | Hour. | Bar. | Therm. | Wind. | | Cloud. | | Remarks. |
|---|---|---|---|---|---|---|---|---|
| Sept. 29, | 7 A. M. | 1·197 | 50°·3 | S. E. | 5 | 10 | N | Rain; 100 rev. anem. in 29$^s$. |
| | 8 | 1·169 | 51 ·1 | S. E. | 5 | 10 | N | Ditto. |
| | 9 | 1·145 | 51 ·1 | S. E. | 5 | 10 | N | Ditto. |
| | 10 | 1·125 | 51 ·4 | S. E. | 5 | 10 | N | Ditto; 100 rev. anem. in 29$^s$. |
| | 11 | 1·111 | 52 ·7 | S. E. | 5 | 10 | N | Ditto. |
| | 12 | 1·070 | 54 ·2 | S. E. | 5 | 10 | N | Ditto. |
| | 1 P. M. | 1·059 | 55 ·0 | S. E. | 5 | 10 | N | Ditto. |
| | 3 | 0·998 | 56 ·2 | S. E. | 4 | 10 | N, S | Ditto. |
| | 5 | 0·955 | 55 ·3 | E. | 4 | 10 | N | Ditto. |
| | 7 | 0·932 | 55 ·0 | E. | 5 | 10 | N | Ditto. |
| | 10 | 0·869 | 55 ·0 | N. E. | 1 | 10 | N | 100 rev. anem. in 164$^s$; aurora. |
| Sept. 30, | 7 A. M. | 0·952 | 55 ·0 | W. | 4 | 10 | N | A little rain. |
| | 8 | 0·979 | 54 ·4 | W. N. W. | 4 | 10 | N | Mizzling rain. |
| | 10 | 0 948 | 54 ·0 | W. | 4 | 10 | S, N | |
| | 11 | 1·062 | 54 ·2 | W. S. W. | 4 | 10 | S, N | |
| | 11 P. M. | 0·833 | 50 ·2 | S. E. | 5 | 4 | S, K S | |
| | 12 | 0·801 | 50 ·2 | S. E. | 5 | 10 | N, S | |
| Oct. 1, | 1 A. M. | 0·752 | 51 ·0 | S. E. | 5 | 10 | N | |
| | 2 | 0·700 | 51 ·0 | S. E. | 4 | 10 | N | |

Sept. 30, 9 P. M.—General southerly current. Centre of vortex to the west of the island; least pressure on west coast. Greatest velocity of wind (on west coast) = 45 feet per second.

Oct. 1, 9 A. M.—Centre of vortex over the island, between Kilrush and Courtown. Absolute minimum of pressure (= 28·838) equally distant from Dublin, Courtown, and Dunmore. Northern stations beginning to be affected by vortex. Greatest velocity of wind (north-east) = 50 feet per second.

Oct. 1, 9 P.M.—Centre north of Portrush. Absolute minimum of pressure (= 28·853) at Portrush; increase of pressure = 0·09 inch. At Donaghadee a sudden shift of the wind from S. S. E. to W. took place at $4^{h}\cdot 30^{m}\cdot$ P. M.

Oct. 4, 5.—Distinct cyclone moving from W. S. W. to E. N. E., and passing over (or near) the northern extremity of the island. (Plate x. Figs. 4, 5, 6.) Mean velocity of wind = 35 feet per second. General electrical disturbance.

Oct. 4, 9 A. M.—General current from S. W.; centre of vortex north-west of island. Greatest velocity of wind (on west coast) = 45 feet per second.

Oct. 4, 9 P. M.—Centre close to northern extremity of the island. Absolute minimum of pressure (=29·182) at Portrush; increase of pressure = 0·11 inch. Greatest velocity of wind (north-west) = 55 feet per second.

Oct. 5, 9 A. M.—Centre north of the island; least pressure at Portrush. Greatest velocity of wind (north) = 60 feet per second.

From the facts above stated, we may draw the following general conclusions:—

1. The occurrence of cyclonic movements in the atmosphere is not infrequent in Ireland, and may be traced even in the case of moderate winds.

2. The rotatory movement is invariably in the same direction, namely, that opposite to the diurnal movement of the sun in azimuth.

3. This rotation is always accompanied by a considerable disturbance of barometric equilibrium, which is greater in proportion to the velocity of the rotatory movement, the pressure being a minimum at the centre of the vortex, and increasing regularly with the distance from that point.

4. The place of greatest velocity appears to have no very definite relation to that of the centre of the vortex, sometimes nearly coinciding with it, and

at others being situated in front, or in the rear, on the right hand or on the the left, of the centre. In the remarkable cyclone of Nov. 18, 19, 1850, the wind raged with greatest violence on the *right hand* of the centre (looking in the direction of the progressive movement); and this appears to be the case of most frequent occurrence.

5. The vortex itself has a *progressive* movement, at the rate of from 100 to 300 miles *per diem*, the average velocity of those observed being 220 miles *per diem*. The direction of this movement is generally from S.W. to N.E.

6. If a line be drawn through the centre of Ireland, in the direction from S.W. to N.E., the track of the centres of by far the greater number of the cyclones, passing over or near Ireland, lies to the north of that line.

7. There is reason to conclude, that these rotatory movements are caused by the conflict of two rectilinear currents moving in different directions.

## STORMS.

For the purpose of eliminating local irregularities, and (to a certain extent also) inequalities of estimation, I have, in examining the distribution of the higher winds, combined the stations into four groups, omitting Portrush and Buncrana, which lie somewhat apart. These groups are as follow:—

I. NORTH-EASTERN.—Donaghadee, Killough, Armagh. Mean latitude = 54°24′, mean longitude = 5°57′.

II. NORTH-WESTERN.—Killybegs, Markree, Westport. Mean latitude = 54°13′, mean longitude = 8°51′.

III. SOUTH-EASTERN.—Dublin, Courtown, Dunmore. Mean latitude = 52°43′, mean longitude = 6°29′.

IV. SOUTH-WESTERN.—Kilrush, Cahirciveen, Castletownsend. Mean latitude = 52°2′, mean longitude = 9°37′.

The line joining groups I. and IV. lies, almost exactly, N.E. and S.W.; and that joining groups II. and III., N.W. and S.E.

The following are the numbers of times in which the average force of the wind, in each of these groups, amounted to a *strong breeze;* or the average velocity to 35 feet per second, and upwards.

TABLE XXV. NUMBER OF TIMES IN WHICH THE VELOCITY OF THE WIND WAS 35 FEET PER SECOND AND UPWARDS.

| Month. | North-East. | North-West. | South-East. | South-West. |
|---|---|---|---|---|
| January, . . . . . | 18 | 19 | 13 | 29 |
| February, . . . . | 7 | 15 | 10 | 13 |
| March, . . . . . | 5 | 15 | 4 | 14 |
| April, . . . . . | 3 | 11 | 3 | 12 |
| May, . . . . . | 2 | 10 | 1 | 4 |
| June, . . . . . | 2 | 15 | 5 | 10 |
| July, . . . . . | 3 | 9 | 4 | 9 |
| August, . . . . . | 0 | 9 | 3 | 7 |
| September, . . . . | 2 | 11 | 3 | 6 |
| October, . . . . . | 3 | 21 | 4 | 17 |
| November, . . . . | 0 | 14 | 1 | 6 |
| December, . . . . | 3 | 9 | 9 | 14 |
| Spring, . . . . . | 10 | 36 | 8 | 30 |
| Summer, . . . . . | 5 | 33 | 12 | 26 |
| Autumn, . . . . . | 5 | 46 | 8 | 29 |
| Winter, . . . . . | 28 | 43 | 32 | 56 |
| Year, . . . . . | 48 | 158 | 60 | 141 |

From the foregoing numbers it appears, that high winds are much more frequent on the western than on the eastern coast, the numbers denoting the relative frequency, on the average of the entire year, being nearly as 3 to 1. This preponderance of high winds on the western coast holds at all seasons of the year, the maximum occurring at the *north-western* extremity in autumn, and at the *south-western* in winter. The greatest frequency is in the north-west, on the average of the entire year.

The following are the cases in which the mean force of the wind, over the whole island, amounted to *a gale;* or in which the mean velocity was 45 feet per second and upwards:—

Nov. 23, 24, 1850.—Storm along the western coast, blowing at first from S. S. W., and veering through S. W. to W. Least pressure in north-west throughout.

Nov. 23, 9 P. M.—Storm began at south-western extremity of the island; velocity = 45 feet per second.

Nov. 24, 9 A. M.—Wind continued to blow in same district; velocity increased to 60 feet per second. Absolute barometric minimum (north-west) = 28·644.

Nov. 24, 9 P. M.—Storm extended over whole of western coast; velocity of wind = 55 feet per second.

Dec. 14.—Storm affecting the whole island, but chiefly the western coast. Wind at first from S. S. W., but veering to W. S. W. at 9 P. M. Least pressure in north-west throughout. Electrical disturbance over the whole island.

Dec. 14, 9 A. M.—Velocity on western coast = 65 feet per second. Absolute barometric minimum (north-west) = 28·952.

Dec. 14, 9 P. M.—Velocity on western coast = 50 feet per second.

Dec. 31, Jan. 1, 1851.—Storm from S. W. and S., beginning on western coast, and extending over whole island.*

Dec. 31, 9 A. M.—Velocity on western coast = 50 feet per second. Direction S. S. W. and S. W.

Dec. 31, 9 P. M.—Gale affecting whole island, except north-eastern extremity. Greatest in south-west; velocity = 60 feet per second. Direction as before. Absolute barometric minimum (north) = 29·177.

Jan. 1, 9 A. M.—Wind abated.

Jan. 1, 9 P. M.—Gale from S. W. and S. over whole island, except north-western extremity. Velocity (south-east) = 55 feet per second. Absolute barometric minimum (north) = 28·975.

In this case, therefore, there were two storms succeeding each other on consecutive days, with a double fall of the barometer. The direction of the wind Jan. 1 P. M. was remarkable. The prevailing current was from S. W., and

* The following extra observations were taken at Markree on December 31, 1850:—

| Date. | Hour. | Bar. | Therm. | Wind. | Cloud. | Remarks. |
|---|---|---|---|---|---|---|
| Dec. 31, | 11 A. M. | 1·122 | 52°·0 | S. 4 | 10 N | Light rain. |
| | 12 | 1·090 | 53 ·7 | S. 4 | 10 N | Ditto. |
| | 1 P. M. | 1·070 | 53 ·75 | S. 4 | 10 N | Mizzling rain. |
| | 3 | 1·040 | 53 ·9 | S. 4 | 10 N | Rain. |
| | 5 | 1·036 | 52 ·0 | S. 3 | 10 S, N | Wind falling since 4 P. M. |

extended over the central parts of the island; while there appears to have been an *indraught* towards it, from the north-western and south-eastern quarters.

Jan. 12, 13.—Storm from S. and S.W., beginning in the north-west, and advancing in the direction from N.W. to S.E. Velocity of wind = 60 feet per second. Least pressure in north-west throughout.*

Jan. 12, 9 P.M.—Gale in north-west.

Jan. 13, 9 A.M.—Storm advanced to line joining north-east and south-west centres. Absolute barometric minimum (north-west) = 29·174; pressure least at Markree at noon.

Jan. 27.—Storm from S. and S.W. in the afternoon of this day, chiefly along the western coast. Velocity of wind = 55 feet per second. Absolute barometric minimum (north-west) = 29·309.†

* The following extra observations were taken at Markree, January 12, 13, 1851:—

| Date. | Hour. | Bar. | Therm. | Wind. | Cloud. | Remarks. |
|---|---|---|---|---|---|---|
| Jan. 12, | 11 P.M. | 1·365 | 44°·0 | S.S.E. 4 | 10 N | Rain. |
| 13, | 7 A.M. | 1·058 | 48 ·5 | S. 5 | 10 N | Moderate rain |
| | 8 | 1·054 | 48 ·8 | S. 5 | 10 N | Light rain. |
| | 11 | 1·000 | 50 ·3 | S.S.E. 5 | 10 N | |
| | 12 | 0·981 | 51 ·1 | S.S.E. 4 | 10 N | |
| | 2 P.M. | 0·994 | 50 ·1 | S. 5 | 3 K, N | Bright sunshine. |
| | 3 | 1·031 | 48 ·8 | S.S.W. 4 | 9 N, CK | Faint sunshine; a little rain. |
| | 4 | 1·070 | 47 ·8 | S.S.W. 3 | 9 N | A little rain. |

† The following extra observations were taken at Courtown on this day:—

| Date. | Hour. | Bar. | Dir. | Force. | Remarks. |
|---|---|---|---|---|---|
| Jan. 27, 1851. | Noon. | 1·755 | S.S.W. | 1 | Cumulus clouds, with cirrus above; partially overcast. |
| | 1 P.M. | 1·737 | S.S.W. | 1 | Sky becoming overcast. |
| | 2 | 1.697 | S. | 2 | Wind veered from S.S.W. to S. |
| | 3 | 1·665 | S. | 3 | Cloudy and sultry. Lind = 0·4 inch. |
| | 4 | 1·637 | S. | 3 | Wind increasing. Lind = 0·6 inch. |
| | 5 | 1·597 | S. | 4 | Ditto; dark in S.S.W. |
| | 6 | 1·563 | S. | 4 | Rain; force of wind greatest. Lind = 0·8 inch. |
| | 7 | 1·517 | S. | 4 | Ditto; darkly overcast. Lind = 0·8 inch. |
| | 8 | 1·507 | S. | 4 | Ditto; ditto. Lind = 0·8 inch. |
| | 9 | 1·500 | S. | 3 | Sky brightening in W. Lind = 0·6 inch. |
| | 10 | 1·500 | S. | 3 | Flashes of lightning in S.S.W. and W. Lind = 0·4 inch. |
| | 11 | 1·500 | S. | 2 | Sky brightening. |
| | 12 | 1·501 | S.W. | 2 | At 11·45 wind veered from S. to S.W. |

June 15, 16.—Gale from S.W. and W., on the western coast. Velocity about 50 feet per second.

June 15, 9 A.M.—Wind from S.W. Velocity on western coast = 50 feet per second. Least pressure in north-west.

June 15, 9 P.M.—Velocity = 45 feet per second. Absolute barometric minimum (north) = 29·575.

June 16, 9 A.M.—Wind from W. Velocity = 50 feet per second.

July 13, 14.—Storm chiefly in north-west, blowing at first from S.S.W., and veering through S.W. to W. This appears to have been a cyclonic gale, the centre of the cyclone passing to the north of the island; it is not included in the former series on account of this circumstance. The velocity of the wind was greatest in the north-west throughout; the barometric pressure was least in the north-west on the 13th, and in the north-east on following day.

July 13, 9 A.M.—Storm from S.S.W., in the north-west of the island. Velocity = 60 feet per second.

July 13, 9 P.M.—Gale veered to S.W., and affected a large portion of the island. Velocity of wind = 60 feet per second, as before. Absolute barometric minimum = 29·052.

July 14, 9 A.M.—Wind veered to W. Velocity in north-west increased to 65 feet per second.*

Dec. 7.—Storm began in south-western extremity of the island, and extended thence over the whole. Direction of wind between S. and S.W.

* The following extra observations were taken at Markree, July 14, 1851. The wind column contains the time of 100 revolutions of Robinson's anenometer:—

| Date. | Hour. | Bar. | Therm. | Wind. | | Cloud. | | Remarks. |
|---|---|---|---|---|---|---|---|---|
| July 14, | 6 A.M. | 1·040 | 55°·2 | W. | 34" | 10 | N | Strong gale; mizzling rain. |
| | 7 | 1·065 | 54 ·2 | W. | 28 | 10 | N | Strong gale; rain. |
| | 8 | 1·086 | 55 ·4 | W. | 28 | 10 | N | Ditto. |
| | 9 | 1·124 | 58 ·4 | W. | 33 | 10 | N | Ditto. |
| | 10 | 1·173 | 55 ·3 | W. | 19 | 9 | N | Ditto; a little rain. |
| | 11 | 1·200 | 59 ·4 | W. | | 9 | N, K | Ditto. |
| | 12 | 1·225 | 58 ·8 | W. | | 9 | N, K | Ditto. |
| | 1 P.M. | 1·260 | 57 ·8 | W. | 18 | 9 | N | Ditto. |
| | 3 | 1·317 | 53 ·9 | W. N.W. | 34 | 5 | N, K | Moderate gale. |

Dec. 7, 9 A. M.—Gale from S. S. W. in the south-west.

Dec. 7, 9 P. M.—Storm over the whole island. Greatest velocity and least pressure in north-west. Velocity = 70 feet per second. Absolute barometric minimum = 29·267. At Cahirciveen the barometer fell until 7 P. M.; and the wind shifted from S. to W. at the same time.*

Dec. 9.—Storm from S. W. along the western coast. Least pressure in north-west throughout.

Dec. 9, 9 A. M.—Velocity of wind in west = 50 feet per second.

Dec. 9, 9 P. M.—Velocity = 60 feet per second. Absolute barometric minimum = 29·632.

Dec. 20.—Gale blowing from S. S. W., beginning on western coast, and advancing to eastern. Least pressure in north and north-west.

Dec. 20 A. M.—Gale on west coast. Velocity = 55 feet per second.

Dec. 20 P. M.—Gale transferred to east coast. Velocity = 50 feet per second. Absolute barometric minimum (north) = 29·457. At Markree there was a sudden shift of the wind from S. S. W. to N. W. at $7^{h}\cdot 35^{m}\cdot$ P. M.

From the foregoing facts we may draw the following conclusions:—

1. The greater gales are much more frequent on the western, than on the eastern coast, the numbers denoting the relative frequency being nearly as 5 to 1. The frequency of storms is nearly the same in the northern and southern portions of the island.

2. The direction of the wind, in all the cases enumerated, was between S. and W. In about half of these cases the wind blew, throughout, from the

* The following extra observations were taken at Cahirciveen on this day:—

| Date. | Hour. | Bar. | Wind. | Remarks. |
|---|---|---|---|---|
| Dec. 7, 1851. | 4 P. M. | 1·550 | S. 4 | Heavy rain, and squally. |
| | 5 | 1·517 | S. 5 | Ditto, ditto. |
| | 6 | 1·446 | S. 5 | Ditto, ditto. |
| | 7 | 1·426 | S. W. 5 | Squally; light rain. |
| | 8 | 1·444 | W. S. W. 4 | Ditto, ditto. |
| | 9 | 1·522 | W. 4 | Drizzling rain. |
| | 10 | 1·564 | W. 3 | Cloudy. |

same point; in half it veered from 4 to 6 points of the compass, the veering being in the direction produced by a cyclone moving from S. W. to N. E., and having the path of its centre to the north of the island.

3. The axis of the gale is in some cases transferred parallel to itself, *to the eastward.* Remarkable instances of this movement occur in the gales of January 12, 13, and December 20.

4. The least barometric pressure occurs, in almost every instance, in the *north-western quarter* of the island.*

5. The locality of the *highest wind* sometimes coincides with that of *least pressure*, and sometimes does not. In the latter case, the axis of least pressure is generally to the *westward* of the axis of the storm.

6. On either side of the axis of a storm, the wind appears to blow *towards that line.* A remarkable instance of this phenomenon occurred in the storm of January 1.†

We are now in a position to consider the question, whether *all* storms are *cyclonic?* And if not, what *proportion* do rotatory storms bear to the whole? Of the greater storms which have occurred since the commencement of these observations, the rotatory character of five (those of October 6, 1850, November 18, January 15, 1851, March 18, and September 29) has been completely established. We have seen in this section, that the same character may be predicated, with great probability, of five more; while there remain five in which the wind has blown, throughout, in the same direction. In fifteen months, accordingly, there have occurred fifteen storms, of which *two-thirds* were *cyclonic.* As respects the remaining one-third, the phenomena are characterized, not only by the absence of any *veering* of the wind, but also by the fact, that the pressures appear to increase with the distance from a *line or axis* of minimum pressure, rather than from a *point;* or, in other words, that the *isobaric* lines are parallel right lines, instead of concentric circles. It is true

* In one case only, the locality of least pressure shifted from the north-western to the north-eastern extremity of the island. This is consistent with the supposition, that the storm in question was a cyclone, whose centre had a progressive motion eastward.

† The conclusions numbered 3, 5, 6, have already been drawn by Mr. ESPY, from an examination of the storms in the United States in the early months of the year 1843.—*First Report on Meteorology.*

that these facts are by no means decisive in disproving rotatory movement; for they are consistent with a rotation of the wind in a plane perpendicular, or highly inclined, to the horizon. Still we are perhaps not justified in assuming the existence of a rotation of this kind, without further evidence; and it seems more reasonable, in the present state of our knowledge, to admit two different kinds of winds, than to endeavour to reduce all to one by the help of a gratuitous hypothesis.

*Hourly Observations.*—It has been already stated, that hourly observations were appointed to be made during twenty-four consecutive hours, at the equinoxes and solstices, in the hope that their results might throw light upon the simultaneous atmospheric changes occurring over the island, and especially upon the direction and rate of progress of atmospheric waves. The observations on the first two of these term-days (March 21 and June 21) at six of the stations, are given in detail at the end of this Paper (Table XXXIV.). Those of the two latter (September 22 and December 22) have been omitted, no atmospheric change of a marked kind having occurred during them.

March 21.—A gale occurred on this day, accompanied by a marked barometric depression. The minimum of pressure took place during the observations, the time of its occurrence varying considerably at the different stations. At Cahirciveen, there was a sudden fall of the barometer between 9 A. M. and 10 A.M. followed by a sudden rise between 12 and 1 P. M., the mercury being nearly stationary from 10 A. M. to 12. A similar change took place at Dunmore East, and at the same hours. For these two stations, accordingly, the epoch of minimum pressure may be taken to be 11 A. M.; the subsequent changes were small and irregular. At Courtown, the barometer descended very slowly and gradually until 5 P. M.; it then ascended until 10 P. M., after which it descended again. All the changes were, however, very small.

At the northern stations the fall of the barometer was more considerable, and more regular. At Markree, where it was most rapid, it amounted to 0·210 in 6 hours. The minimum at Markree occurred between 3 P. M. and 4 P. M.; at Armagh, the minimum took place at 6 P. M.; and at Portrush, at 8 P. M.

From these results it would appear that the trough of the wave travelled from south to north, nearly, with a velocity of about 22 miles per hour. The barometric depression was greatest at Markree, where the barometer stood at

28·689, when lowest. The lowest pressure increased from that point in the south-easterly direction, being 28·972 at Dunmore.

At Markree the wind shifted from S. S. E. to S. S. W. at the time of greatest depression. The same phenomenon took place at Armagh and Portrush, although not with such precision; the change of direction at the former station being from S. S. E. to S., and at the latter from S. E. to S. No similar change occurred at the southern stations.

It should be observed, that the foregoing phenomena are not necessarily to be ascribed to the transit of a rectilinear wave. They are all consistent with the effects of a cyclone, coming from the S. or S. W., the track of its centre lying to the west of the island.

June 21, 22.—The changes of the direction and of the pressure of the wind, on this day, are manifestly the effects of a cyclonic movement, the centre of the vortex sweeping round the north coast of Ireland, in a somewhat curvilinear path, from west to east. It has not been included in the former series, the force of the wind having been below the limit there adopted. At 9 A. M. of the 21st, the centre of the vortex was off the north-west coast, to the west of Killybegs. At 9 P. M. of the same day, it had arrived to the north of Portrush; and at 9 A. M. of the 22nd, it was to the north-east of Donaghadee.

The veering of the wind was, on the average, about 90°; its duration was very different at the different stations, being shortest for those near the path of the centre of the vortex, and longest for those remote. The wind, which was very light throughout, fell about the time of veering at most of the stations.

The descent and subsequent rise of the barometer were regular, and the minimum well-defined. The time of least pressure coincided at all the stations, very nearly, with the middle of the time of veering of the wind; it was earliest on the western coast, and latest on the eastern, the epoch of its occurrence being between 12 and 1 P. M. at Markree and Cahirciveen, and between 5 P. M. and 6 P. M. at Dublin and Courtown. The barometric depression was small, the mean pressure at the epoch of minimum being 29·74.

## HUMIDITY OF THE AIR.

The following Tables give the results of the psychrometrical observations. Table XXVI. contains the monthly means of the *temperatures of evaporation* at

the several stations; and Table xxvii. those of the *tension of vapour*, calculated by Regnault's Table:—

Table XXVI. Temperature of Evaporation.

| Station. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 40°·3 | 40°·5 | 40°·8 | 43°·3 | 48°·1 | 52°·8 | 54°·8 | 56°·8 | 53°·8 | 49°·3 | 42°·0 | 43°·2 | 47°·1 |
| Buncrana, . . . | 39 ·4 | 39 ·6 | 40 ·6 | 42 ·5 | 47 ·5 | 52 ·3 | 53 ·9 | 56 ·2 | 53 ·1 | 48 ·4 | 40 ·2 | 42 ·1 | 46 ·3 |
| Donaghadee, . . | 41 ·1 | 40 ·9 | 41 ·0 | 43 ·5 | 47 ·6 | 52 ·7 | 54 ·3 | 56 ·5 | 54 ·0 | 49 ·4 | 41 ·1 | 43 ·4 | 47 ·1 |
| Killybegs, . . . | 41 ·6 | 41 ·7 | 42 ·6 | 44 ·6 | 49 ·3 | 53 ·6 | 55 ·5 | 58 ·1 | 55 ·7 | 50 ·1 | 43 ·4 | 44 ·4 | 48 ·4 |
| Armagh, . . . . | 39 ·4 | 39 ·5 | 40 ·2 | 42 ·9 | 47 ·2 | 52 ·3 | 54 ·0 | 55 ·5 | 52 ·7 | 48 ·0 | 38 ·9 | 41 ·1 | 46 ·0 |
| Killough, . . . | 42 ·3 | 41 ·8 | 41 ·6 | 44 ·8 | 48 ·9 | 53 ·2 | 56 ·1 | 57 ·2 | 55 ·0 | 50 ·7 | 40 ·6 | 44 .2 | 48 ·0 |
| Markree, . . . | 39 ·2 | 40 ·7 | 41 ·4 | 43 ·7 | 48 ·0 | 52 ·9 | 54 ·8 | 56 ·9 | 53 ·9 | 49 ·3 | 41 ·3 | 41 ·9 | 47 ·0 |
| Westport, . . . | 44 ·2 | 44 ·0 | 44 ·7 | 46 ·3 | 51 ·1 | 55 ·7 | 57 ·8 | 60 ·3 | 58 ·1 | 52 ·7 | 46 ·3 | 46 ·8 | 50 ·7 |
| Dublin, . . . . | 41 ·2 | 41 ·2 | 41 ·5 | 43 ·8 | 48 ·6 | 54 ·2 | 55 ·8 | 58 ·8 | 53 ·1 | 49 ·3 | 39 ·1 | 41 ·3 | 47 ·3 |
| Portarlington, | 41 ·9 | 42 ·0 | 42 ·8 | 44 ·4 | 51 ·6 | 55 ·8 | 56 ·2 | 59 ·1 | 55 ·2 | 51 ·4 | 41 ·3 | 42 ·0 | 48 ·6 |
| Athy, . . . . . | 40 ·4 | 40 ·5 | 41 ·4 | 44 ·6 | 49 ·5 | 55 ·6 | 56 ·5 | 58 ·7 | 53 ·3 | 49 ·8 | 38 ·5 | 41 ·3 | 47 ·5 |
| Courtown, . . . | 41 ·7 | 41 ·8 | 42 ·0 | 44 ·2 | 48 ·9 | 53 ·9 | 56 ·4 | 57 ·9 | 53 ·9 | 49 ·9 | 39 ·4 | 43 ·2 | 47 ·8 |
| Kilrush, . . . . | 42 ·8 | 43 ·7 | 43 ·4 | 45 ·3 | 49 ·7 | 54 ·4 | 56 ·7 | 59 ·2 | 56 ·3 | 50 ·8 | 43 ·1 | 43 ·4 | 49 ·1 |
| Dunmore, . . . | 43 ·5 | 42 ·9 | 42 ·8 | 45 ·5 | 50 ·8 | 54 ·4 | 57 ·4 | 59 ·3 | 55 ·8 | 50 ·7 | 40 ·0 | 43 ·9 | 48 ·9 |
| Cahirciveen, . . | 43 ·5 | 44 ·1 | 44 ·2 | 45 ·6 | 50 ·4 | 54 ·8 | 57 ·4 | 59 ·6 | 55 9 | 51 ·7 | 44 ·3 | 45 ·0 | 49 ·7 |
| Castletownsend, | 43 ·8 | 43 ·9 | 43 ·5 | 45 ·2 | 50 ·7 | 54 ·4 | 58 ·1 | 59 ·9 | 57 ·8 | 51 ·7 | 43 ·4 | 45 ·1 | 49 ·8 |

Table XXVII. Tension of Vapour.

| Station. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | ·243 | ·242 | ·239 | ·256 | ·317 | ·382 | ·414 | ·442 | ·399 | ·337 | ·252 | ·274 | ·316 |
| Buncrana, . . . | ·227 | ·230 | ·229 | ·243 | ·301 | ·365 | ·387 | ·421 | ·379 | ·316 | ·233 | ·256 | ·299 |
| Donaghadee, . | ·250 | ·241 | ·239 | ·250 | ·299 | ·370 | ·395 | ·434 | ·397 | ·338 | ·236 | ·268 | ·310 |
| Killybegs, . . . | ·248 | ·248 | ·253 | ·269 | ·334 | ·389 | ·415 | ·461 | ·423 | ·342 | ·268 | ·282 | ·328 |
| Armagh, . . . . | ·231 | ·228 | ·231 | ·250 | ·295 | ·357 | ·388 | ·412 | ·376 | ·320 | ·224 | ·246 | ·297 |
| Killough, . . . | ·256 | ·249 | ·245 | ·279 | ·329 | ·389 | ·434 | ·451 | ·414 | ·352 | ·237 | ·271 | ·326 |
| Markree, . . . . | ·244 | ·252 | ·252 | ·267 | ·315 | ·378 | ·411 | ·443 | ·407 | ·349 | ·263 | ·271 | ·321 |
| Westport, . . . | ·277 | ·285 | ·288 | ·306 | ·370 | ·443 | ·476 | ·523 | ·486 | ·398 | ·315 | ·321 | ·374 |
| Dublin, . . . . | ·248 | ·243 | ·242 | ·258 | ·306 | ·377 | ·402 | ·466 | ·382 | ·336 | ·229 | ·252 | ·312 |
| Portarlington, | ·250 | ·245 | ·247 | ·249 | ·332 | ·390 | ·401 | ·457 | ·384 | ·359 | ·250 | ·259 | ·319 |
| Athy, . . . . . | ·254 | ·249 | ·252 | ·275 | ·324 | ·417 | ·432 | ·475 | ·403 | ·356 | ·232 | ·261 | ·328 |
| Courtown, . . . | ·258 | ·251 | ·250 | ·266 | ·312 | ·386 | ·424 | ·455 | ·395 | ·351 | ·227 | ·269 | ·320 |
| Kilrush, . . . . | ·269 | ·275 | ·270 | ·285 | ·339 | ·412 | ·436 | ·488 | ·437 | ·364 | ·271 | ·275 | ·343 |
| Dunmore, . . . | ·271 | ·264 | ·262 | ·288 | ·349 | ·380 | ·427 | ·477 | ·415 | ·349 | ·230 | ·273 | ·332 |
| Cahirciveen, . . | ·269 | ·277 | ·274 | ·277 | ·333 | ·400 | ·444 | ·488 | ·421 | ·371 | ·277 | ·290 | ·343 |
| Castletownsend, | ·278 | ·274 | ·264 | ·275 | ·343 | ·400 | ·460 | ·500 | ·465 | ·370 | 267 | ·291 | ·349 |

Very few results of a general nature can be drawn from these observations, the distribution of vapour being governed by the proximity of the station to the sea, or by other local circumstances. It will be seen, from the last column of Table xxvii., that the yearly mean *tension of vapour* increases, although not in any regular progression, in proceeding from the north to the south of the island. Its mean value for the entire island is 0·326 of an inch; its greatest value (at Westport) is 0·374.

The following Table contains the values of the relative *humidity*, the state of complete saturation being represented by 100:—

Table XXVIII. Humidity of the Air.

| Station. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . | 92 | 90 | 87 | 82 | 86 | 86 | 90 | 88 | 90 | 90 | 87 | 93 | 88 |
| Buncrana, . . . | 87 | 87 | 82 | 79 | 81 | 81 | 83 | 83 | 84 | 85 | 86 | 88 | 84 |
| Donaghadee, . . | 92 | 87 | 86 | 78 | 80 | 82 | 84 | 87 | 87 | 89 | 83 | 89 | 85 |
| Killybegs, . . . | 88 | 87 | 85 | 82 | 87 | 84 | 85 | 86 | 87 | 87 | 88 | 91 | 86 |
| Armagh, . . . . | 89 | 87 | 86 | 81 | 80 | 78 | 82 | 83 | 85 | 88 | 88 | 89 | 85 |
| Killough, . . . | 88 | 87 | 86 | 86 | 87 | 88 | 89 | 89 | 88 | 88 | 86 | 86 | 87 |
| Markree, . . . . | 99 | 96 | 92 | 87 | 86 | 84 | 89 | 89 | 93 | 96 | 98 | 99 | 92 |
| Westport, . . . | 89 | 95 | 93 | 93 | 94 | 96 | 97 | 97 | 99 | 97 | 98 | 98 | 96 |
| Dublin, . . . . | 88 | 86 | 85 | 80 | 77 | 75 | 76 | 83 | 85 | 88 | 89 | 90 | 84 |
| Portarlington, | 87 | 84 | 80 | 72 | 72 | 72 | 74 | 77 | 74 | 86 | 90 | 91 | 80 |
| Athy, . . . . . | 98 | 95 | 91 | 85 | 81 | 84 | 85 | 88 | 95 | 95 | 95 | 98 | 91 |
| Courtown, . . | 93 | 89 | 86 | 83 | 78 | 81 | 83 | 85 | 86 | 92 | 87 | 90 | 86 |
| Kilrush, . . . . | 94 | 91 | 90 | 87 | 87 | 90 | 86 | 91 | 90 | 93 | 92 | 92 | 90 |
| Dunmore, . . . | 90 | 90 | 89 | 87 | 85 | 78 | 77 | 84 | 82 | 85 | 85 | 88 | 85 |
| Cahirciveen, . . | 89 | 89 | 88 | 80 | 79 | 82 | 84 | 87 | 85 | 90 | 88 | 91 | 86 |
| Castletownsend, | 92 | 89 | 86 | 81 | 82 | 85 | 86 | 90 | 90 | 89 | 88 | 92 | 88 |

The distribution of *humidity* is still more under the influence of local circumstances, and therefore still less regular. Thus, Portrush and Castletownsend—the one at the northern, the other at the southern extremity of the island—have nearly the same mean humidity; while Portarlington and Athy—places near each other, and both inland—are almost at the opposite extremities of the scale. The *driest* station is Portarlington; the *most humid*, Westport. At the latter place, in fact, the air is nearly saturated with moisture, the place of observation being entirely surrounded by water, and but a few feet above the sea. The *mean humidity* for the entire island, for the year 1851, is 87.

## RAIN.

Before proceeding to the observations of rain-fall throughout Ireland in the year 1851, it is important that we should know its *normal* amount at one or more stations, as deduced from the mean of several years. We have, for this purpose, two series of observations, one at Dublin, and the other at Armagh, extending uninterruptedly over eleven and twelve years respectively. The results of these two series are contained in the following Tables.

TABLE XXIX. MONTHLY FALL OF RAIN AT DUBLIN, IN INCHES (1841–1851).

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1841 | 2·41 | 1·00 | 2.12 | 1·12 | 1·94 | 1·84 | 2·52 | 2·22 | 1·88 | 4·89 | 3·58 | 2·98 | 28·50 |
| 1842 | 1·41 | 3·11 | 2·47 | 0·81 | 3·18 | 2·00 | 2·57 | 1·24 | 4·60 | 1·54 | 4·37 | 0·78 | 28·08 |
| 1843 | 2·15 | 1·84 | 1·65 | 3·34 | 4·51 | 2·60 | 1·93 | 2·12 | 0·67 | 3·44 | 3·10 | 0·35 | 27·70 |
| 1844 | 1·54 | 2·37 | 2·34 | 0·95 | 0·21 | 1·69 | 1·83 | 3·77 | 2·55 | 3·32 | 5·24 | 2·60 | 28·41 |
| 1845 | 4·48 | 0·81 | 1·72 | 0·88 | 1·54 | 4·00 | 3·33 | 2·52 | 0·95 | 3·92 | 3·56 | 3·77 | 31·48 |
| 1846 | 3·43 | 1·42 | 2·85 | 5·97 | 2·14 | 1·50 | 3·14 | 4·33 | 2·98 | 4·72 | 2·80 | 0·83 | 36·11 |
| 1847 | 3·57 | 2·63 | 1·22 | 3·42 | 2·21 | 1·91 | 0·64 | 1·43 | 1·35 | 2·13 | 2·09 | 3·20 | 25·80 |
| 1848 | 1·88 | 3.23 | 2·40 | 3·15 | 0·93 | 3·92 | 2·37 | 5·10 | 2·42 | 4·38 | 1·50 | 2·83 | 34·11 |
| 1849 | 3·30 | 0·72 | 1·07 | 2·57 | 2·07 | 0·47 | 2·69 | 3·33 | 3·83 | 3·93 | 1·80 | 4·03 | 29·81 |
| 1850 | 2·25 | 1·47 | 1·14 | 3·63 | 2·42 | 1·69 | 2·26 | 1·38 | 1·99 | 1·24 | 2·32 | 2·39 | 24·18 |
| 1851 | 5·28 | 0·49 | 2·38 | 1·77 | 1·31 | 2·71 | 3·48 | 2·01 | 1·81 | 3·27 | 1·01 | 0·88 | 26·40 |
| Means | 2·88 | 1·74 | 1·94 | 2·51 | 2·04 | 2·21 | 2·43 | 2·68 | 2·28 | 3·34 | 2·85 | 2·24 | 29·14 |

TABLE XXX. MONTHLY FALL OF RAIN AT ARMAGH, IN INCHES (1840–1851).

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1840 | 4·94 | 2·75 | 0·46 | 0·76 | 3·03 | 2·50 | 3 15 | 2·66 | 2·42 | 1·26 | 3·45 | 2·82 | 30·20 |
| 1841 | 2·00 | 2·27 | 3·65 | 1·70 | 1·55 | 2·60 | 2·35 | 2·90 | 2·31 | 4·00 | 3·02 | 3·50 | 31·85 |
| 1842 | 2·79 | 2·73 | 4·23 | 0·03 | 4·08 | 2·42 | 3·01 | 2·98 | 2·85 | 1·98 | 4·71 | 3·01 | 34·82 |
| 1843 | 2·25 | 1·27 | 1·93 | 2·93 | 3·94 | 3·34 | 4·16 | 3·84 | 1·22 | 4·00 | 3·19 | 2·24 | 34·31 |
| 1844 | 2·64 | 3·24 | 2·89 | 1·67 | 0·04 | 4·47 | 2·36 | 3·07 | 2·23 | 4·35 | 3·00 | 0·53 | 30·49 |
| 1845 | 4·99 | 1·33 | 1·62 | 3·16 | 0·39 | 5·57 | 3·63 | 1·88 | 2·83 | 4·84 | 4·76 | 5·26 | 40·26 |
| 1846 | 4·58 | 1·86 | 3·79 | 2·85 | 1·68 | 2·10 | 3·85 | 3·55 | 3·35 | 4·93 | 3·30 | 1·63 | 37·47 |
| 1847 | 3·03 | 1·97 | 1·46 | 3·15 | 2·48 | 1·91 | 1·08 | 1·10 | 2·67 | 3·78 | 3·78 | 5·86 | 32·27 |
| 1848 | 1·87 | 6·75 | 3·77 | 3·32 | 1·24 | 2·73 | 3·92 | 3·48 | 2·38 | 3·15 | 3·70 | 3·01 | 39·32 |
| 1849 | 6·30 | 2·51 | 1·48 | 2·09 | 3·00 | 0·87 | 3·98 | 2·89 | 3·55 | 4·39 | 2·73 | 3·26 | 37·05 |
| 1850 | 4·08 | 5·04 | 1·24 | 3·51 | 2·41 | 2·37 | 3·14 | 2·72 | 2·71 | 2·24 | 3·21 | 2·46 | 35·13 |
| 1851 | 5·53 | 2·83 | 2·55 | 1·54 | 1·92 | 3·45 | 3·66 | 2·81 | 2·44 | 2·90 | 1·41 | 2·11 | 33·15 |
| Means | 3·75 | 2·88 | 2·42 | 2·23 | 2·15 | 2·86 | 3·19 | 2·82 | 2·58 | 3·48 | 3·35 | 2·97 | 34·68 |

The lowest line in each gives the *mean monthly* fall of rain. It will be seen, from an inspection of the numbers, that there is no regular progression in the amount of rain-fall throughout the year, such as is observed in the phenomena of temperature or humidity. In Dublin the greatest rain-fall, in the mean of the eleven years, occurs in October, and the least in February; their amounts are 3·34 and 1·74 inches respectively. At Armagh the maximum is in January, and the minimum in May; and they amount to 3·75 and 2·15 inches. The *mean yearly* rain-fall at Dublin is 29·14 inches; that at Armagh is 34·68 inches.

The following Table gives the monthly fall of rain in the year 1851, at all the meteorological stations:—

Table XXXI. Monthly Fall of Rain in the Year 1851, at all the Meteorological Stations.

| Station. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portrush, . . . . | 5 69 | 2.71 | 3·45 | 1·20 | 1·91 | 3·12 | 2·86 | 3·52 | 1·36 | 5·10 | 4·34 | 1·98 |
| Buncrana, . . . | 4·91 | 2.89 | 3·36 | 1·78 | 1·69 | 2·83 | 3·41 | 3·30 | 2·48 | 5·20 | 5·04 | 2·39 |
| Donaghadee, . . | 5·45 | 1·51 | 3·38 | 1·30 | 1·40 | 2·93 | 2·16 | 3·18 | 0·96 | 1·82 | 2·38 | 1·46 |
| Killybegs, . . . | 4·26 | 2·84 | 2·20 | 1·58 | 1·82 | 3·08 | 2·84 | 2·93 | 2·84 | 3·46 | 3·25 | 2·10 |
| Armagh, . . . . | 5.81 | 2·83 | 2·65 | 1·54 | 1·92 | 3·13 | 3·81 | 2·56 | 1·84 | 3·48 | 1·47 | 2·01 |
| Killough, . . . . | 4·00 | 1·18 | 2·47 | 1·03 | 1·29 | 2·63 | 2·73 | 2·06 | 1·00 | 2·69 | 1·19 | 0·92 |
| Markree, . . . . | 5·01 | 2·89 | 3·07 | 2·23 | 1·53 | 2·67 | 5·20 | 5·15 | 2·40 | 4·42 | 3·68 | 2·06 |
| Westport,* . . . | 5·06 | 4·37 | 5·61 | 4·85 | 1·24 | 4·55 | 3·78 | 3·43 | 2·02 | 5·55 | 2·60 | 2·80 |
| Dublin, . . . . . | 5·28 | 0·49 | 2·38 | 1·77 | 1·31 | 2·71 | 3·48 | 2·01 | 1·81 | 3·27 | 1·01 | 0·88 |
| Portarlington, . | 4·11 | 0·52 | 2·07 | 0·94 | 0·82 | 2·51 | 2·59 | 1·61 | 0·84 | 2·59 | 1·15 | 1·48 |
| Athy, . . . . . | 5·10 | 0·93 | 2·37 | 1·29 | 1·35 | 2·68 | 2·73 | 2·91 | 1·24 | 3·24 | 1·41 | 1·49 |
| Courtown, . . . | 7·98 | 0·95 | 3·44 | 2·14 | 1·17 | 3·08 | 2·67 | 1·65 | 0·63 | 3·41 | 0·55 | 1·97 |
| Kilrush, . . . . | 6·42 | 1·69 | 3·99 | 1·75 | 0·96 | 2·50 | 2·83 | 2·85 | 0·79 | 4·44 | 2·10 | 2·26 |
| Dunmore, . . . | 8·33 | 0·97 | 3·87 | 1·69 | 1·26 | 3·82 | 2·67 | 2·80 | 0·66 | 4·29 | 0·74 | 2·41 |
| Cahirciveen, . . | 11·22 | 4·90 | 6·41 | 2·17 | 2·31 | 4·71 | 5·51 | 5·31 | 2·63 | 7·74 | 2·13 | 4·33 |
| Castletownsend, | 9·76 | 3·67 | 4·03 | 1·53 | 1·87 | 4·87 | 4·79 | 3·80 | 0·68 | 4·59 | 0·82 | 2·12 |

It will be seen from the foregoing Table, that the greatest diversity exists in the amount of rain-fall in different localities. To render this more apparent, and to facilitate the examination of the causes which influence the distribution, I have, in the following Table, given the yearly rain-fall at the several stations arranged in the order of magnitude, beginning with the smallest:—

* The amount for the month of January at Westport is incomplete, the observations having commenced in the middle of the month.

TABLE XXXII. TOTAL RAIN-FALL IN THE YEAR 1851, AT THE SEVERAL METEOROLOGICAL STATIONS.

| | | |
|---|---|---|
| 20—25 inches, | Portarlington, | 21·23 inches. |
| | Killough, | 23·19 ,, |
| 25—30 ,, | Dublin, | 26·40 ,, |
| | Athy, | 26·74 ,, |
| | Donaghadee, | 27·93 ,, |
| | Courtown, | 29·64 ,, |
| 30—35 ,, | Kilrush, | 32·58 ,, |
| | Armagh, | 33·05 ,, |
| | Killybegs, | 33·20 ,, |
| | Dunmore, | 33·54 ,, |
| 35—40 ,, | Portrush, | 37·24 ,, |
| | Buncrana, | 39·28 ,, |
| 40—45 ,, | Markree, | 40·31 ,, |
| | Castletownsend, | 42·53 ,, |
| 45—50 ,, | Westport, | 45·86 ,, |
| 50—60 ,, | Cahirciveen, | 59·37 ,, |

Thus, it will be seen, the greatest rain (at Cahirciveen) is *nearly treble* of the least (at Portarlington). The *mean rain-fall* throughout Ireland, in the year 1851, is 34·50 inches.

If we assume the *proportion* of rain at the different stations to be constant, or nearly so, the numbers of the preceding Table may all be reduced to their *mean values*, by multiplying by the factor which expresses the relation of the rain of 1851 to the mean at any one station. We already possess two such mean values: viz., at Armagh and Dublin. They are 29·14 and 34·68 inches respectively; and the factors thence deduced are 1·10 and 1·05.

When we examine the results of the preceding Table, taken in connexion with the geographical position and physical circumstances of the stations, we arrive at the following conclusions:—

1. The places of *least rain* are either inland, or on the eastern coast; while those of *greatest rain* are at, or near, the western coast. Thus the stations at which the yearly fall of rain exceeds 40 inches are all on the western and south-western coasts; while those at which it is below 30 inches are either inland or on the eastern.

2. The amount of rain is greatly dependent on the proximity of a mountain chain or group, being always considerable in such neighbourhood, unless the station be to the east or north-east of the same. Thus, of the places of *least rain*, Portarlington lies to the north-east of Slieve-bloom; Killough, to the north-east of the Mourne range; Dublin, to the north-east of the Dublin and Wicklow range; while, on the other hand, the places of *greatest rain*,—Cahirciveen, Westport, and Castletownsend—are in the vicinity of high mountains, but on a different side.

These facts are easily explained. The prevailing wind blows from the S. W., and reaches this island loaded with the vapour of the gulf-stream. This vapour is condensed and precipitated in rain, when it first meets the colder air over the land, namely, on the western and south-western shores. But the principal condensing centres are the mountains, in the neighbourhood of which, consequently, the precipitation is more abundant, and especially on their western and south-western sides. And the same circumstance which causes the greater precipitation at these points must also protect the region over which the wind next passes (the north-east), the air being thus deprived of a large portion of its vapour before arriving there.

## TABLES.

The following Tables contain the portions of the individual observations, the results of which are referred to in pages 450–469.

Table XXXIII. contains the selected observations on days of storm, or of marked cyclonic movement. It comprises the direction and force of the wind, the pressure, temperature, and amount of cloud, at the time of observation; as also the greatest and least temperatures, and the quantity of rain fallen, in the preceding twenty-four hours. The pressures are, for comparison, reduced to the mean sea-level; the numbers in the Table are the excesses above 28 inches. The force of the wind is expressed in terms of the scale (0 – 6).

Table XXXIV. contains the hourly observations on the term-days, March 21, 22, and June 21, 22, at Portrush, Armagh, Markree, Courtown, Dunmore, and Cahirciveen. The *velocity* of the wind at Portrush, Armagh, Markree, and Courtown, was observed by means of ROBINSON'S anemometer; it is expressed in feet per second.

TABLE XXXIII. SELECTED OBSERVATIONS.

| Station. | 1850. October 6, 9 A. M. | | | | | | October 6, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 2 | 1·573 | 46°·7 | 8 | ·04 | S. | 2 | 0·952 | 50°·5 | 56°·0 | 41°·0 |
| Buncrana, . . | S. | 1 | 1·527 | 49 ·6 | 10 | ·36 | S. | 0 | 1·022 | 50 ·6 | 55 ·0 | 43 ·0 |
| Donaghadee, . | S. W. | 0 | 1·590 | 49 ·7 | 10 | ·01 | S. W. | 5 | 0·998 | 51 ·1 | 54 ·7 | 43 ·5 |
| Killybegs, . . . | S. | — | 1·387 | 48 ·7 | — | ·47 | N. W | 5 | 0·836 | 53 ·0 | 55 ·0 | 48 .0 |
| Armagh, . . . | S. | 1·9 | 1·558 | 47 ·3 | 10 | ·03 | S. | 3·0 | 0·906 | 49 ·2 | 55 ·0 | 44 ·5 |
| Markree, . . . | S. E. | 4 | 1·383 | 47 ·1 | 10 | ·27 | W.N.W. | 6 | 0·908 | 52 ·0 | 55 ·5 | 40 ·2 |
| Dublin, . . . . | S. E. | 1 | 1·562 | 49 ·1 | 10 | ·09 | S. | 4 | 1·063 | 52 ·5 | 60 ·5 | 45 ·3 |
| Courtown, . . | S. | 2 | 1·550 | 50 ·5 | 10 | ·10 | S. W. | 2 | 1·180 | 52 ·2 | 59 ·2 | 42 ·0 |
| Kilrush, . . . | S. W. | 3 | 1·392 | 54 ·3 | — | ·04 | S. S. W. | 5 | 1·242 | 49 ·3 | 59 ·0 | 49 ·5 |
| Dunmore, . . . | S. | 3 | 1·490 | 53 ·8 | — | ·27 | W. | 3 | 1·242 | 53 ·3 | 53 ·5 | 47 ·5 |
| Cahirciveen, . | W.S.W. | 4 | 1·309 | — | 10 | ·00 | N.W. | 4 | — | — | — | — |
| Castletownsend, | W.S.W. | 3 | 1·423 | 55 ·5 | 10 | — | S. S. W. | 5 | 1·382 | 51 ·5 | 61 ·0 | 50 ·5 |

| Station. | October 7, 9 A.M. | | | | | | October 22, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | N. W. | 5 | 1·245 | 48°·5 | 7 | ·42 | N. W. | 2 | 1·645 | 50°·7 | 54°·0 | 41°·0 |
| Buncrana, . . | N. N. W. | 4 | 1·458 | 49 ·6 | 5 | ·58 | N. W. | 3 | 1·721 | 48 ·6 | — | 36 ·0 |
| Donaghadee, . | N. W. | 5 | 1·190 | 52 ·2 | 10 | ·25 | N. W. | 3 | 1·610 | 49 ·4 | — | 41 ·0 |
| Killybegs, . . . | N. W. | — | 1·460 | 52 ·8 | — | ·15 | N. W. | — | 1·708 | 51 ·0 | 53 ·5 | 42 ·3 |
| Armagh, . . . | N. W. | 2·6 | 1·340 | 51 ·0 | 8 | ·28 | N. W. | 2·3 | 1·640 | 47 ·5 | 49 ·9 | 41 ·0 |
| Markree, . . . | W. N. W. | 5 | 1·493 | 51 ·0 | 7 | ·23 | N. N. W. | 3 | 1·682 | 48 ·8 | 52 ·6 | 31 ·7 |
| Dublin, . . . . | S. W. | 4 | 1·425 | 50 ·9 | 1 | ·07 | S. W. | 3 | 1·649 | 48 ·9 | 51 ·2 | 35 ·5 |
| Courtown, . . | W. | 4 | 1·488 | 50 ·5 | 3 | ·12 | S. W. | — | 1·736 | 45 ·2 | 48 ·0 | 34 ·0 |
| Kilrush, . . . . | N. W. | 4 | 1·590 | 49 ·8 | — | ·15 | N. W. | 4 | 1·851 | 52 ·3 | 54 ·0 | 39 ·0 |
| Dunmore, . . . | W. N. W. | 3 | 1·588 | 52 ·3 | — | ·10 | S. W. | 4 | 2·233? | 43 ·3 | 49 ·5 | 36 ·0 |
| Cahirciveen, . | N. W. | 3 | 1·226? | — | 6 | ·00 | W. N. W. | 2 | 1·831 | 53 ·6 | 55 ·0 | 39 ·0 |
| Castletownsend, | W. S. W. | 1 | 1·714 | 54 ·5 | 3 | — | W. S. W. | 3 | 1·837 | 51 ·5 | 55 ·0 | 39 ·0 |

REMARKS.

Oct. 6, 9 A. M.—Rain throughout the island; heavy rain at Cahirciveen.
Oct. 6, 9 P. M.—Storm in north-west from 10 30 P. M. to 3 A. M. of following day. Showers in south; hail at Markree.
Oct. 7, 9 A. M.—Showers at Portrush, Donaghadee, and Cahirciveen; hail at Markree.
Oct.22, 9 P. M.—Heavy clouds at Buncrana, rising from the horizon in north-east, at this and at succeeding observation. Rain in south.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | OCTOBER 23, 9 A. M. | | | | | | OCTOBER 23, 9 P. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | N. E. | 2 | 1·489 | 47°·0 | 4 | ·24 | N. | 2 | 1·439 | 47°·3 | 47°·0 | 43°·0 |
| Buncrana, . . | N. N. E. | 2 | 1·543 | 40 ·6 | 6 | ·68 | N. N. E. | 4 | 1·512 | 44 ·6 | — | 38 ·0 |
| Donaghadee, . | N. E. | 3 | 1·422 | 47 ·6 | 5 | ·13 | N. N. W. | 2 | 1·360 | 44 ·4 | 50 ·0 | 42 ·6 |
| Killybegs, . . | N. | — | 1·540 | 43 ·3 | — | ·27 | N. | — | 1·464 | 46 ·8 | 49 ·2 | 42 ·0 |
| Armagh, . . . | N. N. W. | 1·1 | 1·478 | 40 ·5 | 2 | ·23 | W. N. W. | 1·1 | 1·414 | 41 ·8 | 47 ·8 | 38 ·5 |
| Markree, . . . | N. | 3 | 1·552 | 44 ·9 | 9 | ·33 | N. | 3 | 1·469 | 44 ·3 | 48 ·2 | 41 ·0 |
| Dublin, . . . . | N. W. | 2 | 1·454 | 44 ·4 | 1 | ·05 | — | 3 | 1·407 | 43 ·1 | 50 ·5 | 39 ·3 |
| Courtown, . . | N. W. | — | 1·445 | 44 ·0 | 2 | ·08 | N. W. | — | 1·413 | 43 ·0 | 51 ·0 | 42 ·2 |
| Kilrush, . . . | N. N. W. | 5 | 1·628 | 47 ·3 | — | ·27 | N. | 4 | 1·593 | 45 ·4 | 49 ·0 | 44 ·2 |
| Dunmore, . . | N. W. | 3 | 1·470 | 45 ·8 | — | ·18 | N. W. | 3 | 1·425 | 43 ·3 | 48 ·0 | 41 ·5 |
| Cahirciveen, | N. | 3 | 1·619 | 49 ·8 | 10 | ·57 | N. E. | 3 | 1·621 | 46 ·8 | 48 ·0 | 45 ·6 |
| Castletownsend, | N. | 1 | 1·610 | 48 ·5 | 9 | ·00 | N. | 1 | 1·544 | 44 ·5 | 52 ·0 | 46 ·0 |

| Station. | NOVEMBER 18, 9 P. M. | | | | | | NOVEMBER 19, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. E. | 2 | 1·169 | 47°·8 | 55°·0 | 43°·0 | S. E. | 2 | 0·408 | 47°·5 | 9 | ·67 |
| Buncrana, . . . | S. S. E. | 5 | 1·205 | 46 ·8 | — | 42 ·0 | S. | 3 | 0·411 | 45 ·7 | 10 | ·88 |
| Donaghadee, . | S. E. | 4 | 1·195 | 48 ·5 | — | 41 ·5 | S. | 5 | 0·438 | 48 ·9 | 10 | ·59 |
| Killybegs, . . . | S. E. | 5 | 0·991 | 49 ·5 | 54 ·0 | 43 ·8 | N. | — | 0·307 | 44 ·9 | — | ·50 |
| Armagh, . . . | S. E. | 2 ·3 | 1·055 | 50 ·0 | 54 ·5 | 39 ·0 | S. S. E. | 3·4 | 0·248 | 44 ·5 | 10 | ·70 |
| Markree, . . . | S. E. | 5 | 0·813 | 53 ·3 | 54 ·4 | 35 ·9 | N. N. W. | 3 | 0·285 | 45 ·6 | 10 | ·61 |
| Dublin, . . . . | S. S. E. | 2 | 1·126 | 55 ·4 | 58 ·2 | 44 ·0 | S. | 5 | 0·383 | 45 ·2 | 10 | ·51 |
| Courtown, . . | S. S. W. | 3 | 1·214 | 55 ·2 | 57 ·0 | 42 ·0 | S. S. W. | 5 | 0·589 | 48 ·0 | 10 | ·70 |
| Kilrush, . . . . | S. E. | 5 | 0·916 | 48 ·6 | 55 ·6 | 46 ·0 | W. N W. | 6 | 0·542 | 56 ·2? | 10 | 2·40 |
| Dunmore, . . . | S. W. | 5 | 1·146 | 49 ·8 | 53 ·5 | 46 ·0 | W. | 6 | 0·671 | 48 ·8 | — | ·72 |
| Cahirciveen, . | S. W. | 5 | 0·923 | 55 ·8 | 58 ·5 | 45 ·8? | W. N. W. | 5 | 0·825 | 48 ·2 | 10 | ·97 |
| Castletownsend, | S. W. | 5 | 1·148 | 54 ·5 | 56 ·0 | 42 ·0 | N. W. | 5 | 0·864 | 47 ·0 | 10 | 1·00 |

REMARKS.

Oct. 23, 9 A. M.—Squally day. Showers on west coast; hail at Markree.
Oct. 23, 9 P. M.—Showers throughout, except south-eastern quarter; hail at Buncrana and Markree.
Nov. 18, 9 P. M.—Rapid fall of barometer. Continued rain throughout the island.
Nov. 19, 9 A. M.—Surface of mercury *concave* at Dublin. Rain throughout; heavy at Kilrush and Castletownsend. Spray from the sea supposed to have reached the gauge at Kilrush.

Table XXXIII. (*continued*). Selected Observations.

| Station. | November 19, 9 P. M. | | | | | | November 20, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force. | | | | | Direction. | Force | | | | |
| Portrush, . . . | N. E. | 3 | 0·587 | 49°·5 | 52°·0 | 44°·0 | N. E. | 3 | 1·113 | 49°·6 | 6 | ·31 |
| Buncrana, . . . | N. | 3 | 0·610 | 47 ·5 | — | 44 ·0 | N. N. E. | 4 | 1·172 | 44 ·4 | 7 | ·16 |
| Donaghadee, . | N. E. | 4 | 0·410 | 46 ·4 | 50 ·0 | 43 ·0 | N. E. | 4 | 1·001 | 49 ·0 | 10 | ·23 |
| Killybegs, . . . | N. | — | 0·714 | 49 ·3 | 51 ·8 | 44 ·0 | N. | — | 1·214 | 47 ·5 | — | ·04 |
| Armagh, . . . | N. W. | 2·6 | 0·571 | 46 ·0 | 54 ·0 | 44 ·0 | N. N. W. | 2·0 | 1·096 | 48 ·5 | 9 | ·21 |
| Markree, . . . | N. W. | 4 | 0·694 | 47 ·6 | 50 ·8 | 40 ·2 | N. W. | 5 | 1·245 | 48 ·0 | 10 | ·14 |
| Dublin, . . . . | W. | 4 | 0·549 | 47 ·9 | 50 ·5 | 45 ·7 | N. N. W. | 3 | 1·003 | 48 ·5 | 9 | ·17 |
| Courtown, . . | W. S. W. | 4 | 0·585 | 47 ·5 | 51 ·0 | 49 ·0? | N. N. W. | 2 | 0·947 | 47 ·0 | 6 | ·40 |
| Kilrush, . . . . | W. N. W. | 5 | 0·794 | 45 ·3 | — | 44 ·5 | N. W. | 6 | 1·354 | 47 ·3 | 10 | ·90 |
| Dunmore, . . . | W. N. W. | 5 | 0·711 | 46 ·8 | 49 ·5 | 46 ·5 | N. W. | 4 | 1·071 | 48 ·8 | — | ·25 |
| Cahirciveen, . . | W. N. W. | 5 | 1·147 | 48 ·8 | 50 ·0 | 47 ·0 | N. | 5 | 1·435 | 46 ·2 | 10 | ·10 |
| Castletownsend, | W. | 3 | 0·949 | 45 ·5 | 56 ·0 | 47 ·0 | N. | 3 | 1·240 | 48 ·5 | 8 | ·33 |

| Station. | November 23, 9 P. M. | | | | | | November 24, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force. | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 3 | 1·235 | 43°·4 | 52°·0 | 44°·0 | S. W. | 2 | 0·741 | 48°·2 | 9 | ·30 |
| Buncrana, . . . | W. | 2 | 1·197 | 42 ·1 | — | 44 ·2 | S. W. | 2 | 0·770 | 47 ·8 | 9 | ·20 |
| Donaghadee, . | S. S. W. | 1 | 1·362 | 44 ·0 | 50 ·0 | 46 ·0 | S. W. | 1 | 0·775 | 48 ·9 | 9 | ·26 |
| Killybegs, . . . | S. W. | 1 | 1·243 | 46 ·5 | 52 ·5 | 47 ·3 | S. W. | 3 | 0·684 | 50 ·5 | — | ·25 |
| Armagh, . . . | S. S. W. | 2·6 | 1·294 | 42 2 | 52 ·0 | 41 ·1 | S. W. | 2·9 | 0·723 | 50 ·0 | 10 | ·26 |
| Markree, . . . | S. | 3 | 1·210 | 42 ·9 | 51 ·4 | 42 ·5 | S. W. | 3 | 0·605 | 49 ·6 | 8 | ·37 |
| Dublin, . . . . | S. | 3 | 1·389 | 43 ·4 | 57 ·3 | 45 ·5 | S. W. | 2 | 0·797 | 51 ·5 | 6 | ·25 |
| Courtown, . . | S. S. W. | 1 | 1·446? | 43 ·0 | 56 ·5 | 42 ·0 | S. W. | 3 | 0·870 | 54 ·0 | 10 | ·46 |
| Kilrush, . . . . | S. S. E. | 3 | 1·247 | 48 ·3 | 56 ·0 | 47 ·5 | W. S. W. | 5 | 0·718 | 52 ·3 | 10 | ·25 |
| Dunmore, . . . | S. W. | 4 | 1·380 | 53 ·3 | 53 ·5 | 44 ·5 | S. W. | 5 | 0·895 | 52 ·8 | — | ·40 |
| Cahirciveen, . | S. W. | 4 | 1·215 | 52 ·8 | 57 ·5 | 47 ·4 | W. S. W. | 5 | 0·834 | 51 ·6 | 8 | ·61 |
| Castletownsend, | S. W. | 5 | 1·376 | 49 ·5 | 55 ·0 | 47 ·0 | W. S. W. | 5 | 0·922 | 53 ·5 | 10 | ·52 |

Remarks.

Nov. 19, 9 P. M.—Showers throughout, except south-eastern quarter.
Nov. 23, 9 P. M.—Rain on west coast.
Nov. 24, 9 A. M.—Showers in various places; thunder and lightning at Cahirciveen.
Nov. 24, 9 P. M.—Showers throughout the island.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | NOVEMBER 24, 9 P. M. | | | | | | DECEMBER 14, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 4 | 0·568 | 47°·9 | 52°·0 | 41°·0 | S. | 4 | 1·164 | 40°·2 | 9 | ·03 |
| Buncrana, . . | N. W. | 5 | 0·498 | 46 ·6 | — | 41 ·1 | S. S. W. | 5 | 1·079 | 42 ·6 | 10 | ·06 |
| Donaghadee, . | W. | 3 | 0·586 | 47 ·4 | 51 ·4 | 43 ·1 | S. S. W. | 4 | 1·353 | 42 ·4 | 10 | ·16 |
| Killybegs, . . . | W. N. W. | 5 | 0·715 | 48 ·5 | 52 ·3 | 45 ·0 | S. | 6 | 0·948 | 47 ·5 | — | ·06 |
| Armagh, . . . | W. S. W. | 2·6 | 0·690 | 45 ·2 | 51 ·8 | 42 ·0 | S. S. E. | 4·1 | 1·185 | 42 ·2 | 10 | .03 |
| Markree, . . . | W. S. W. | 5 | 0·777 | 42 ·6 | 50 ·8 | 41 ·2 | S. S. W. | 6 | 0·955 | 44 ·6 | 10 | ·23 |
| Dublin, . . . . | S. W. | 5 | 0·776 | 45 ·4 | 56 ·5 | 44 ·2 | S. S. E. | 2 | 1·347 | 47 ·4 | 10 | ·04 |
| Courtown, . . | W. S. W. | 3 | 0·850 | 45 ·0 | 55 ·5 | 40 ·0 | S. W. | 3 | 1·429 | 39 ·0 | 10 | ·00 |
| Kilrush, . . . . | W. N. W. | 5 | 0·914 | 44 ·8 | 53 ·5 | 48 ·5 | S. W. | 5 | 1·174 | 43 ·3 | 10 | ·55 |
| Dunmore, . . . | W. | 5 | 0·947 | 52 ·3? | 50 ·0 | 49 ·5 | S. W. | 4 | 1·386 | 49 ·3 | — | ·23 |
| Cahirciveen, . | W. | 5 | — | 47 ·8 | 56 ·0 | 47 ·0 | W. | 5 | 1·242 | 45 ·2 | 8 | ·50 |
| Castletownsend, | W. | 5 | 1·013 | 48 ·5 | 55 ·0 | 46 ·0 | S. W. | 5 | 1·297 | 50 ·5 | 10 | ·26 |

| Station. | DECEMBER 14, 9 P. M. | | | | | | DECEMBER 15, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 3 | 1·055 | 38°·6 | 47°·0 | 37°·0 | S. W. | 4 | 1·055 | 40°·0 | 3 | ·32 |
| Buncrana, . . . | W. S. W. | 3 | 0·982 | 38 ·6 | — | 38 ·0 | W. | 4 | 1·026 | 39 ·6 | 4 | ·41 |
| Donaghadee, . | W. S. W. | 3 | 1·118 | 39 ·4 | 48 ·0 | 40 ·0 | W. | 3 | 1·137 | 37 ·4 | 8 | ·41 |
| Killybegs, . . . | W. | 5 | 1·104 | 42 ·3 | 45 ·0 | 38 ·0 | W. | 5 | 1·146 | 42 ·3 | — | ·43 |
| Armagh, . . . | S. W. | 3·4 | 1·163 | 36 ·7 | 46 ·8 | 34 ·0 | S. W. | 3·0 | 1·163 | 37 ·5 | 9 | ·48 |
| Markree, . . . | S. W. | 3 | 1·156 | 36 ·2 | 45 ·7 | 37 ·8 | S. W. | 1 | 1·061 | 39 ·6 | 9 | ·30 |
| Dublin, . . . . | S. S. W. | 4 | 1·276 | 38 ·4 | 52 ·8 | 41 ·0 | S. S. W. | 2 | 1·255 | 42 ·4 | 10 | ·58 |
| Courtown, . . | S. W. | 3 | 1·314 | 37 ·5 | 41 ·5 | 36 ·0 | S. W. | 1 | 1·316 | 40 ·0 | 10 | ·61 |
| Kilrush, . . . . | W. S. W. | 5 | 1·326 | 39 ·8 | 45 ·0 | 41 ·0 | W. S. W. | 2 | 1·294 | 46 ·3 | 10 | ·40 |
| Dunmore, . . . | N. W. | 5 | 1·396 | 40 ·8 | 51 ·0 | 41 ·5 | S. W. | 2 | 1·310 | 46 ·3 | — | ·25 |
| Cahirciveen, . | W. | 5 | 1·404 | 42 ·8 | 43 ·0 | 41 ·0 | S. W. | 2 | 1·213 | 47 ·4 | 10 | ·23 |
| Castletownsend, | W. S. W. | 5 | 1·409 | 44 ·5 | 51 ·0 | 42 ·0 | S. W. | 3 | 1·300 | 46 ·5 | 10 | ·69 |

REMARKS.

Nov. 24, 9 P. M.—Gale from 6 P. M. to 9 P. M. at Markree.
Dec. 14, 9 A. M.—Thunder and lightning at Cahirciveen and Kilrush.
Dec. 14, 9 P. M.—Thunder and lightning throughout the island. Hail fell in several places during the day.

Table XXXIII. (*continued*). Selected Observations.

| Station. | December 31, 9 A.M. | | | | | | December 31, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 3 | 1·430 | 44°·4 | 9 | ·12 | S. | 3 | 1·173 | 50°·0 | 56°·0 | 40°·0 |
| Buncrana, . . . | S. S. W. | 4 | 1·400 | 47 ·6 | 10 | ·00 | S. S. W. | 4 | 1·180 | 48 ·6 | — | 42 ·0 |
| Donaghadee, . | S. S. W. | 3 | 1·525 | 44 ·9 | 10 | ·04 | S. W. | 2 | 1·291 | 49 ·4 | 52 ·0 | 41 ·5 |
| Killybegs, . . | S. S. W. | 4 | 1·317 | 50 ·2 | — | ·06 | S. S. W. | 5 | 1·171 | 49 ·4 | 52 ·0 | 44 ·0 |
| Armagh, . . . | S. | 3·8 | 1·463 | 47 ·0 | 10 | ·05 | S. | 3 0 | 1·264 | 51· 1 | 53 ·8 | 46 ·0 |
| Markree, . . . | S. | 4 | 1·311 | 50 ·2 | 10 | ·11 | S. S. W. | 3 | 1·204 | 50 ·2 | 54 ·2 | 38 ·6 |
| Dublin, . . . . | S. | 2 | 1·543 | 51 ·9 | 10 | ·03 | S. | 3 | 1·306 | 54 ·9 | 57 ·8 | 48 ·5 |
| Courtown, . . | S. | 3 | 1·631 | 50 ·5 | 10 | ·00 | S. S. W. | 5 | 1·399 | 53 ·2 | 55 ·0 | 48 ·0 |
| Kilrush, . . . . | S. W. | 3 | 1·455 | 52 ·3 | 10 | ·15 | S. S. W. | 5 | 1·270 | 51 ·3 | — | 42 ·5 |
| Dunmore, . . . | S. W. | 3 | 1·606 | 51 ·8 | — | ·02 | S. S. W. | 5 | 1·405 | 52 ·8 | 52 ·5 | 47 ·0 |
| Cahirciveen, . | W. | 5 | 1·405 | 55 ·2 | 10 | ·00 | S. W. | 5 | 1·314 | 51 ·6 | 56 ·0 | 51 ·0 |
| Castletownsend, | S. S. W. | 5 | 1·580 | 52 ·0 | 10 | ·10 | S. W. | 6 | 1·379 | 53 ·5 | 54 ·0 | 48 ·5 |

| Station. | 1851. January 1, 9 A.M. | | | | | | January 1, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 3 | 1·282 | 46°·4 | 4 | ·12 | S. | 1 | 0·949 | 47°·0 | 51°·0 | 43° 0 |
| Buncrana, . . . | S. S. W. | 2 | 1·298 | 44 ·6 | 8 | ·08 | N. N. W. | 2 | 1·000 | 43 ·6 | — | 43 ·0 |
| Donaghadee, . | W. S. W. | 2 | 1·370 | 47 ·4 | 9 | ·08 | S. W. | 4 | 1·055 | 49 ·9 | 53 ·0 | 45 ·2 |
| Killybegs, . . . | S. W. | 2 | 1·285 | 47 ·5 | — | ·15 | W. N. W. | 1 | 1·066 | 43 ·5 | 47 ·2 | 45 ·0 |
| Armagh, . . . | S. W. | 3·8 | 1·383 | 48 ·0 | 10 | ·29 | S. | 3·8 | 0·998 | 53 ·1 | 54 ·5 | 41 ·5 |
| Killough, . . . | S. W. | 3 | 1·444 | 48 ·3 | 7 | ·00 | S. | 6 | 1·108 | 47 ·5 | 52 ·0 | 48 ·0 |
| Markree, . . . | S. | 2 | 1·319 | 44 ·6 | 10 | ·38 | N. W. | 3 | 1·078 | 42 ·7 | 48 ·3 | 44 ·0 |
| Dublin, . . . . | S. S. W. | 3 | 1·421 | 51 ·5 | 10 | ·20 | S. | 4 | 1·109 | 56 ·5 | 58 ·0 | 52 ·2 |
| Courtown, . . | S. S. W. | 3 | 1·455 | 51 ·5 | 10 | ·15 | S. | 5 | 1·230 | 53 ·5 | 55 ·5 | 50 ·0 |
| Kilrush, . . . . | S. W. | 2 | 1·503 | 50 ·3 | 10 | ·08 | S. S. W. | 5 | 1·029 | 53 ·3 | — | 49 ·0 |
| Dunmore, . . . | S. W. | 3 | 1·417 | 51 ·8 | — | ·15 | S. | 5 | 1·210 | 53 ·8 | 54 ·0 | 49 ·5 |
| Cahirciveen, . | S. W. | 3 | 1·427 | 50 ·8 | 10 | ·60 | W. | 2 | — | 46 ·8 | 56 .0 | 49 ·4 |
| Castletownsend, | S. W. | 5 | 1·463 | 51 ·5 | 10 | ·55 | S. S. W. | 6 | 1·144 | 52 ·5 | 55 ·0 | 48 ·0 |

Remarks.

Dec 31, 9 A.M.—Rain on west coast.
Dec. 31, 9 P.M.—Rain in south; light rain on the east coast. Lightning observed at Killybegs. At Markree gale abated at 4 P.M.
Jan. 1, 9 A.M.—Lightning observed at Markree. Rain in south-west.
Jan. 1, 9 P.M.—Rain throughout; continued rain in north.

Table XXXIII. (*continued*). Selected Observations.

| Station. | January 12, 9 P.M. | | | | | | January 13, 9 A.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 3 | 1·697 | 42°·5 | 49°·0 | 42°·0 | S. | 4 | 1·283 | 48°·4 | 10 | ·27 |
| Buncrana, . . . | S. | 4 | 1·669 | 43 ·4 | — | 42 ·0 | S. S. W. | 5 | 1·254 | 49 ·4 | 10 | ·35 |
| Donaghadee, . | S. | 3 | 1·800 | 44 ·4 | 49 ·5 | 45 ·5 | S. S. W. | 4 | 1·407 | 47 ·6 | 10 | ·01 |
| Killybegs, . . . | S. | 6 | 1·535 | 45 ·3 | 51 ·2 | 42 ·2 | S. | 3 | 1·157 | 49 ·6 | — | ·05 |
| Armagh, . . . | S. | 2·9 | 1·720 | 43 ·2 | 50 ·0 | 40 ·8 | S. | 4·5 | 1·327 | 49 ·0 | 10 | ·22 |
| Killough, . . . | S. | 3 | 1·776 | 46 ·8 | 53 ·0 | 43 ·0 | S. W. | 5 | 1·377 | 49 ·3 | 8 | ·00 |
| Markree, . . . | S. S. E. | 4 | 1·560 | 43 ·2 | 40 ·8 | 36 ·6 | S. | 5 | 1·190 | 49 ·5 | 10 | ·05 |
| Dublin, . . . . | S. S. E. | 3 | 1·797 | 44 ·7 | 53 ·0 | 42 ·6 | S. S. E. | 3 | 1·455 | 51 ·2 | 9 | ·00 |
| Courtown, . . | S. | 2 | 1·830 | 45 ·0 | 51 ·5 | 42 ·0 | S. | 3 | 1·507 | 50 ·5 | 10 | ·00 |
| Kilrush, . . . . | S. W. | 3 | 1·651 | 47 ·3 | 51 ·0 | 42 ·5 | S. W. | 5 | 1·543? | 49 ·8 | 10 | ·30 |
| Dunmore, . . . | S. S. W. | 3 | 1·801 | 46 ·8 | 50 ·5 | 41 ·5 | S. W. | 5 | 1·463 | 50 ·3 | — | ·00 |
| Cahirciveen, . | S. W. | 4 | 1·628 | 48 ·6 | 52 ·0 | 44 ·0 | S. W. | 5 | 1·244 | 52 ·2 | 10 | 1·03 |
| Castletownsend, | S. W. | 5 | 1·719 | 47 ·5 | 51 ·0 | 42 ·5 | S. S. W. | 6 | 1·347 | 50 ·0 | 10 | ·10 |

| Station. | January 15, 9 A.M. | | | | | | January 15, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. E. | 2 | 0·967 | 43°·2 | 10 | ·76 | W. | 3 | 1·212 | 44°·7 | 47°·0 | 41°·0 |
| Buncrana, . . . | S. E. | 2 | 0·970 | 44 ·1 | 10 | ·55 | N. N. W. | 4 | 1·186 | 42 ·6 | — | 43 ·0 |
| Donaghadee, . | S. E. | 4 | 0·996 | 44 ·9 | 10 | ·82 | N. W. | 3 | 1·218 | 43 ·9 | 47 ·5 | 44 ·6 |
| Killybegs, . . . | E. S. E. | 0 | 0·949 | 43 ·8 | — | ·68 | W. N. W. | 3 | 1·321 | 44 ·0 | 46 ·0 | 42 ·5 |
| Armagh, . . . | E. S. E | 1·5 | 0·946 | 44 ·9 | 10 | ·76 | W. | 1·5 | 1·312 | 41 ·2 | 47 0 | 36 ·0 |
| Killough, . . . | S. E. | 3 | 0·980 | 45 ·9 | 7 | ·61 | N. W. | 3 | 1·349 | 42 ·5 | 48 ·0 | 45 ·0 |
| Markree, . . . | N. W. | 2 | 0·906 | 42 ·4 | 10 | ·78 | S. W. | 2 | 1·365 | 37 ·5 | 47 ·6 | 40 8 |
| Westport, . . . | N. E. | 5 | 0·972 | 42 ·0 | — | ·56 | — | — | — | — | — | — |
| Dublin, . . . . | E. | 2 | 0·868 | 47 ·4 | 10 | ·81 | S. W. | 3 | 1·361 | 40 ·5 | 49 ·5 | 44 ·8 |
| Courtown, . . . | E. | 3 | 0·807 | 48 ·2 | 10 | ·90 | W. S. W. | 2 | 1·424 | 40 ·0 | 50 ·0 | 42 ·5 |
| Kilrush, . . . . | N. | 5 | 0·862 | 39 ·8 | 10 | 1·06 | W. | 3 | 1·428 | 39 ·8 | 51 ·5 | 39 ·5 |
| Dunmore, . . . | E. S. E. | 4 | 0·718 | 47 ·8 | — | ·98 | W. S. W. | 1 | 1·485 | 39 ·8 | 49 ·5 | 45 ·5 |
| Castletownsend, | N. | 5 | 0·827 | 40 ·5 | 10 | 1·15 | N. W. | 2 | 1·499 | 40 ·5 | 52 ·0 | 41 ·0 |

Remarks.

Jan. 12, 9 P.M.—Showers on west coast. Lunar halo observed at Buncrana, Donaghadee, and Courtown.

Jan. 13, 9 A.M.—Rain in several places, but not universal.

Jan. 15, 9 A.M.—Rain throughout the island.

Jan. 15, 9 P.M.—At Markree, gale lasted from 1 P.M. to 6 P.M. Lunar halo observed at Markree and Donaghadee.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | JANUARY 16, 9 A.M. | | | | | | JANUARY 16, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 3 | 1·138 | 40°·3 | 10 | ·28 | S. | 3 | 0·723 | 49°·0 | 52°·0 | 35°·0 |
| Buncrana, . . . | S. | 5 | 1·087 | 41 ·6 | 10 | ·35 | S. S. W. | 5 | 0·671 | 48 ·1 | — | 37 ·0 |
| Donaghadee, . | S. | 6 | 1·254 | 43 ·4 | 10 | ·49 | S. W. | 4 | 0·872 | 48 ·4 | 50 ·1 | 39 ·0 |
| Killybegs, . . | S. E. | 5 | 0·925 | 45 ·3 | — | ·28 | W. N. W. | 6 | 0·772 | 48 ·0 | 54 ·2 | 38 ·5 |
| Armagh, . . . | S. S. E. | 5·0 | 1·072 | 44 ·1 | 10 | ·61 | S. W. | 4·5 | 0·858 | 47 ·8 | 52 ·2 | 38 ·0 |
| Killough, . . . | S. | 6 | 1·153 | 45 ·4 | 10 | ·42 | S. W. | 6 | 0·948 | 48 ·3 | 51 ·0 | 40 ·0 |
| Markree, . . . | S. E. | 5 | 0·879 | 46 ·8 | 10 | ·31 | S. W. | 5 | 0·876 | 45 ·7 | 52 ·0 | 33 ·7 |
| Westport, . . . | S. | 6 | 0·812 | 54 ·0 | — | ·69 | — | — | — | — | — | — |
| Dublin, . . . . | S. E. | 4 | 1·182 | 47 ·1 | 10 | ·73 | S. | 4 | 0·966 | 49 ·3 | 56 ·0 | 39 ·7 |
| Courtown, . . | S. | 5 | 1·209 | 47 ·5 | 10 | ·54 | S. S. W. | 3 | 1·059 | 48 ·0 | 53 ·5 | 33 ·0 |
| Kilrush, . . . | S. W. | 5 | 0·922 | 50 ·8 | 10 | ·50 | S. W. | 5 | 0·980 | 48 ·8? | 52 ·0 | 39 ·5 |
| Dunmore, . . . | S. | 5 | 1·144 | 48 ·8 | — | ·96 | W. S. W. | 5 | 1·112 | 47 ·3 | 51 ·5 | 38 ·0 |
| Cahirciveen, . | S. S. W. | 5 | 0·863 | 54 ·0 | 10 | ·00 | W. | 5 | 1·041 | 46 ·0 | 55 ·0 | — |
| Castletownsend, | S. W. | 5 | 0·857 | 51 ·5 | 10 | ·73 | W. S. W. | 6 | 1·093 | 48 ·5 | 54 ·0 | 40 ·0 |

| Station. | JANUARY 27, 9 P.M. | | | | | | JANUARY 28, 9 A.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. E. | 3 | 1·456 | 45°·7 | 47°·0 | 33°·0 | S. | 1 | 1·547 | 38°·8 | 2 | ·12 |
| Buncrana, . . . | S. | 5 | 1·378 | 45 ·6 | 46 ·0 | 35 ·0 | S. S. W. | 3 | 1·506 | 39 ·6 | 4 | ·03 |
| Donaghadee, . | S. S. E. | 5 | 1·575 | 45 ·6 | 47 ·0 | 36 ·5 | S. W. | 1 | 1·634 | 39 ·9 | 2 | ·22 |
| Killybegs, . . . | S. | 5 | 1·285 | 45 ·7 | 47 ·5 | 38 ·0 | W. S. W. | 3 | 1·487 | 42 ·7 | — | ·03 |
| Armagh, . . . | S. | 3·8 | 1·439 | 45 ·9 | 46 ·0 | 35 ·0 | S. | 3·0 | 1·588 | 39 ·4 | 0 | ·08 |
| Killough, . . . | S. | 3 | 1·542 | 44 ·5 | 45 ·0 | 36 ·0 | S. W. | 3 | 1·665 | 41 ·6 | 2 | ·18 |
| Markree, . . . | S. | 4 | 1·333 | 41 ·4 | 45 ·8 | 29 ·8 | S. E. | 2 | 1·507 | 38 ·6 | 10 | ·23 |
| Westport, . . . | — | — | — | — | — | — | S. W. | 3 | 1·461 | 46 ·0 | — | ·48 |
| Dublin, . . . . | S. E. | 2 | 1·516 | 45 ·5 | 49 ·0 | 35 ·0 | S. | 1 | 1·645 | 40 ·9 | 6 | ·15 |
| Courtown, . . | S. | 3 | 1·542 | 43 ·8 | 49 ·0 | 31 ·2 | S. W. | 1 | 1·690 | 37 ·0 | 3 | ·34 |
| Kilrush, . . . . | S. W. | 5 | 1·329 | 41 ·8 | 48 ·0 | 37 ·5 | S. | 3 | 1·514 | 42 ·3 | 10 | ·23 |
| Dunmore, . . . | S. S. W. | 5 | 1·516 | 46 ·3 | 47 ·0 | 35 ·0 | S. W. | 2 | 1·658 | 47 ·3 | — | ·25 |
| Cahirciveen, . . | S. W. | 5 | 1·349 | 43 ·8 | 49 ·6 | 36 ·6 | S. W. | 4 | 1·470 | 44 ·4 | 10 | ·67 |
| Castletownsend, | W. S. W. | 5 | 1·452 | 44 ·5 | 50 ·0 | 37 ·0 | S W. | 5 | 1·620 | 44 ·5 | 10 | ·33 |

REMARKS.

Jan, 16, 9 A.M.—Lightning at Westport. Rain throughout the island.
Jan. 16, 9 P.M.—Lunar halo at Dublin and Courtown. Showers at various places.
Jan. 27, 9 P.M.—Rain at both extremities of the island; hail in south. Gale lasted from noon to 3 P.M. at Castletownsend, from 4 P.M. to 7 P.M. at Markree.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | JANUARY 30, 9 P. M. | | | | | | JANUARY 31, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 1 | 1·162 | 35°·1 | 39°·0 | 34°·0 | E. | 1 | 1·168 | 33°·4 | 6 | ·00 |
| Buncrana, . . . | S. S. W. | 2 | 1·217? | 33 ·6 | 39 ·0 | 35 ·0 | S. E. | 3 | 1·090 | 36 ·6 | 8 | ·00 |
| Donaghadee, . | W. S. W. | 1 | 1·189 | 32 ·6 | 40 ·0 | 35 ·0 | S. S. E. | 1 | 1·175 | 35 .4 | 9 | ·01 |
| Killybegs, . . . | S. W. | 3 | 1·128 | 37 ·5 | 41 ·5 | 36 ·0 | S. E. | 2 | 1·082 | 38 ·7 | — | ·05 |
| Armagh, . . . | S. W. | 1·4 | 1·185 | 31 ·9 | 38 ·8 | 33 ·0 | S. S. E. | 0·5 | 1·137 | 35 ·9 | 10 | ·01 |
| Killough, . . . | W. | 1 | 1·191 | 41 ·8? | 47 ·0 | 37 ·0 | S. E. | 1 | 1·168 | 42 ·3 | 8 | ·00 |
| Markree, . . . | S. W. | 1 | 1·149 | 32 ·3 | 38 ·7 | 32 ·7 | S. E. | 1 | 1·058 | 34 ·9 | 10 | ·26 |
| Westport, . . . | — | — | — | — | — | — | N. | 2 | 1·032 | 44 ·0 | — | ·50 |
| Dublin, . . . . | S. W. | 2 | 1·220 | 35 ·0 | 42 ·5 | 35 ·5 | S. E. | 0 | 1·127 | 35 ·9 | 6 | ·08 |
| Courtown, . . . | W. S. W. | 2 | 1·221 | 34 ·0 | 41 ·0 | 32 ·7 | S. | 1 | 1·124 | 35 ·0 | 4 | ·07 |
| Kilrush, . . . . | W. N. W. | 3 | 1·224 | 38 ·3 | 44 ·0 | 35 ·5 | W. | 2 | 1·100 | 42 ·8 | 10 | ·24 |
| Dunmore, . . . | W. | 2 | 1·245 | 36 ·8 | 41 ·5 | 35 ·5 | W. | 2 | 1·157 | 38 ·8 | — | ·07 |
| Cahirciveen, . . | W. N. W. | 3 | 1·255 | 41 ·6 | 45 ·0 | 37 ·8 | W. N. W. | 3 | 1·070 | 43 ·6 | 9 | ·25 |
| Castletownsend, | W. S. W. | 4 | 1·338 | 38 ·5 | 42 ·5 | 37 ·0 | W. S. W. | 2 | 1·184 | 41 ·5 | 10 | ·33 |

| Station. | JANUARY 31, 9 P. M. | | | | | | MARCH 18, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | N. | 2 | 1·440 | 40°·7 | 44°·0 | 30°·0 | S. E. | 3 | 1·395 | 42°·9 | 10 | ·09 |
| Buncrana, . . . | S. E. | 1 | 1·484 | 34 ·8 | 41 ·0 | 33 ·0 | S. | 4 | 1·373 | 41 ·6 | 10 | ·27 |
| Donaghadee, . | N. E. | 3 | 1·441 | 40 ·9 | 44 ·0 | 31 ·5 | S. S. E. | 4 | 1·475 | 44 ·6 | 10 | ·13 |
| Killybegs, . . . | N. E. | 0 | 1·525 | 36 ·5 | 43 ·3 | 34 ·8 | W. N. W. | 4 | 1·325 | 41 ·3 | — | ·22 |
| Armagh, . . . | N. | 1·2 | 1·485 | 32 ·6 | 40 ·8 | 31 ·0 | S. E. | 3·5 | 1·328 | 45 ·1 | 10 | ·23 |
| Killough, . . . | N. E. | 0 | 1·460 | 34 ·4 | 44 ·0 | 32 0 | S. | 3 | 1·460 | 45 ·3 | 10 | ·26 |
| Markree, . . . | N. | 2 | 1·531 | 35 ·3 | 42 ·1 | 29 ·8 | S. W. | 3 | 1·331 | 45 ·6 | 9 | ·25 |
| Westport, . . . | — | — | — | — | — | — | W. | 6 | 1·366 | 47 ·0 | — | ·56 |
| Dublin, . . . . | N. | 3 | 1·382 | 40 ·0 | 44 ·8 | 34 ·3 | S. W. | 3 | 1·381 | 50 ·9 | 10 | ·39 |
| Courtown, . . | N. E. | 4 | 1·288 | 40 ·7 | 44 ·5 | 32 ·5 | S W. | 3 | 1·460 | 50 ·7 | 10 | ·33 |
| Kilrush, . . . . | N. N. E. | 2 | 1·380 | 38 ·8 | 44 ·0 | 34 ·5 | W. S. W. | 5 | 1·465 | 44 ·8 | 8 | ·20 |
| Dunmore, . . . | E. | 4 | 1·258 | 41 ·8 | 44 ·0 | 37 ·0 | W. S. W. | 4 | 1·504 | 48 ·8 | — | ·26 |
| Cahirciveen, . | N. E. | 4 | 1·268 | 42 ·4 | 46 ·2 | 37 ·0 | W. S. W. | 4 | 1·458 | 48 ·2 | 6 | ·40 |
| Castletownsend, | N. | 2 | 1·243 | 43 ·5 | 48 ·0 | 36 ·0 | W. N. W. | 5 | 1·523 | 50 ·5 | 8 | ·24 |

REMARKS.

Jan. 30, 9 P. M.—Lightning at Markree and Buncrana. Rain, snow, and hail in west.
Jan. 31, 9 A. M.—Lightning observed in north in the evening. Light rain on west coast. Hail and sleet in some places.
March 18, 9 A. M.—Rain throughout island, south-eastern quarter excepted.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | MARCH 18, 9 P. M. | | | | | | MARCH 19, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 3 | 1·371 | 42°·4 | 49°·0 | 39°·0 | S. W. | 3 | 1·449 | 44°·3 | 4 | ·46 |
| Buncrana, . . . | W. S. W. | 3 | 1·376 | 41 ·1 | 50 ·0 | 40 ·0 | S. W. | 2 | 1·395 | 46 ·6 | 5 | ·31 |
| Donaghadee, . | W. | 3 | 1·454 | 41 ·4 | 50 ·5 | 41 ·5 | W. S. W. | 2 | 1·520 | 44 ·4 | 9 | ·46 |
| Killybegs, . . . | W. | 5 | 1·408 | 45 ·0 | 49 ·5 | 41 ·0 | W. S. W. | 0 | 1·450 | 47 ·1 | — | ·00 |
| Armagh, . . . | S. S. W. | 2·5 | 1·470 | 40 ·8 | 49 ·5 | 40 ·0 | S. | 2 | 1·487 | 44 ·5 | 10 | ·25 |
| Killough, . . . | S. W. | 3 | 1·500 | 43 ·3 | 50 ·0 | 41 ·0 | W. | 3 | 1·510? | 44 ·5 | 2 | ·18 |
| Markree, . . . | S. E. | 3 | 1·465 | 42 ·7 | 48 ·7 | 39 ·5 | S. E. | 2 | 1·386 | 46 ·3 | 10 | ·14 |
| Westport, . . . | W. | 5 | 1·495 | 47 ·0 | — | — | S. | 2 | 1·428 | 47 ·0 | — | ·14 |
| Dublin, . . . . | S. S. W. | 3 | 1·557 | 43 ·7 | 54 ·3 | 41 ·5 | S. E. | 0 | 1·518 | 46 ·5 | 10 | ·03 |
| Courtown, . . | S. W. | 1 | 1·608 | 41 ·2 | 55 ·0 | 41 ·5 | S. | 1 | 1·534 | 46 ·5 | 10 | ·00 |
| Kilrush, . . . . | W. | 4 | 1·608 | 46 ·8 | 48 ·5 | 40 ·5 | S. E. | 2 | 1·411 | 46 ·8 | 10 | ·06 |
| Dunmore, . . . | W. | 3 | 1·634 | 45 ·3 | 57 ·5 | 43 ·0 | S. S. W. | 2 | 1·504 | 47 ·3 | — | ·16 |
| Cahirciveen, . | W. S. W. | 3 | 1·671 | 45 ·6 | 51 ·0 | 46 ·4 | E. S. E. | 1 | 1·345 | 46 ·4 | 10 | ·32 |
| Castletownsend, | W. | 3 | 1·662 | 47 ·5 | 53 ·0 | 46 ·5 | S. W. | 5 | 1·393 | 47 ·5 | 10 | ·10 |

| Station. | MARCH 19, 9 P. M. | | | | | | MARCH 25, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. E. | 3 | 1·121 | 44°·1 | 51°·0 | 40°·0 | S. E. | 3 | 1·611 | 44°·2 | 10 | ·01 |
| Buncrana, . . . | S. | 3 | 1·112 | 44 ·4 | 52 ·0 | 41 ·0 | S. | 3 | 1·579 | 45 ·4 | 9 | ·00 |
| Donaghadee, . | S. | 3 | 1·170 | 45 ·4 | 50 ·3 | 40 ·5 | S S. E. | 3 | 1·676 | 45 ·4 | 10 | ·00 |
| Killybegs, . . . | S. S. E. | 6 | 0·953 | 45 ·3 | 50 ·3 | 42 ·3 | S. E. | 3 | 1·437 | 46 ·0 | — | ·10 |
| Armagh, . . . | S. | 2·8 | 1·108 | 43 ·0 | 49 ·5 | 39 ·0 | S. E. | 2·5 | 1·590 | 45 ·5 | 10 | ·01 |
| Killough, . . . | S. | 3 | 1·240 | 45 ·4 | 51 ·0 | 41 ·0 | S. | 2 | 1·677 | 46 ·4 | 10 | ·00 |
| Markree, . . . | S. | 5 | 0·900 | 41 ·3 | 47 ·6 | 38 ·0 | W. S. W. | 4 | 1·444 | 46 ·2 | 10 | ·20 |
| Westport, . . . | S. W. | 6 | 0·773 | 45 ·0 | — | — | W. | 3 | 1·408 | 50 ·0 | — | ·35 |
| Dublin, . . . . | S. | 3 | 1·143 | 44 ·5 | 49 ·5 | 42 ·0 | S. E. | 2 | 1·592 | 45 ·9 | 10 | ·25 |
| Courtown, . . | S. S. W. | 3 | 1·180 | 45 ·8 | 51 ·5 | 39 ·8 | S. E. | 3 | 1·599 | 47 ·0 | 10 | ·34 |
| Kilrush, . . . | S. W. | 5 | 1·014 | 43 ·8 | 52 ·0 | 44 ·5 | W. S. W. | 3 | 1·513 | 50 ·3 | 10 | ·34 |
| Dunmore, . . . | S. S. W. | 4 | 1·207 | 46 ·8 | 50 ·5 | 47 ·5? | S. S. W. | 1 | 1·487 | 49 ·8 | — | ·56 |
| Cahirciveen, . | W. S. W. | 4 | 1·069 | 45 ·6 | 53 ·4 | 45 ·2 | W. | 3 | 1·460 | 51 ·8 | 9 | ·68 |
| Castletownsend, | W. | 5 | 1·129 | 48 ·5 | 52 ·5 | 46 ·0 | S. W. | 3 | 1·520 | 52 ·5 | 10 | ·30 |

REMARKS.

March 18, 9 P. M.—Lightning observed at Markree, Buncrana, and Donaghadee. Rain in the north-west. Lunar halo observed at Armagh.

March 19, 9 A. M.—At 2 P. M. the wind shifted to S. S. E. at Donaghadee, and to E. S. E. at Killybegs; the shift being followed by a gale. Rain in the south. Solar halo observed at Armagh.

March 25, 9 A. M.—Light rain throughout, south-western quarter excepted.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | JUNE 11, 9 P M. | | | | | | JUNE 12, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 2 | 1·748 | 51°·3 | 56°·0 | 46°·0 | N. E. | 3 | 1·455 | 49°·1 | 10 | ·58 |
| Buncrana, . . . | N. | 3 | 1·689 | 51 ·6 | 63 ·0 | 41 ·0 | S. E. | 5 | 1·466 | 52 ·6 | 8 | ·34 |
| Donaghadee, . | S. | 2 | 1·806 | 50 ·6 | 59 ·5 | 44 ·6 | S. W. | 1 | 1·425 | 57 ·6 | 10 | ·54 |
| Killybegs, . . . | S. E. | 5 | 1·683 | 49 ·2 | 67 ·0 | 47 ·2 | E. | 0 | 1·443 | 56 ·4 | — | ·64 |
| Armagh, . . . | S. E. | 3 | 1·710 | 48 ·5 | 60 ·0 | 42 ·3 | N. W. | 0·5 | 1·407 | 55 ·3 | 10 | ·76 |
| Killough, . . . | S. | 3 | 1·760 | 52 ·7 | 64 ·0 | 45 ·0 | S. | 3 | 1·531 | 54 ·4 | 10 | ·96 |
| Markree, . . . | E. | 4 | 1·523 | 48 ·0 | 61 ·4 | 43 ·1 | N. E. | 2 | 1·381 | 57 ·7 | 10 | ·49 |
| Westport, . . . | S. E. | 3 | 1·614 | 54 ·0 | — | — | N. E. | 2 | 1·396 | 54 ·0 | — | 1·04 |
| Dublin, . . . . | S. E. | 4 | 1·675 | 49 ·1 | 65 ·7 | 42 ·5 | S. | 1 | 1·401 | 66 ·4? | 9 | ·28 |
| Courtown, . . . | S. E. | 4 | 1·695 | 49 ·5 | 61 ·0 | 39 ·2 | S. W. | 3 | 1·445 | 59 ·0 | 10 | ·85 |
| Kilrush, . . . . | S. | 2 | 1·463 | 54 ·8 | 59 ·0 | 44 ·5 | S. W. | 2 | 1·347 | 57 ·8 | 10 | ·35 |
| Dunmore, . . . | S. S. E. | 5 | 1·556 | 53 ·8 | 57 ·5 | 45 ·0 | S. W. | 2 | 1·440 | 56 ·3 | — | 1·00 |
| Cahirciveen, . . | S. | 3 | 1·412 | 56 ·4 | — | 41 ·4 | S. | 2 | 1·348 | 57 ·6 | 10 | 1·12 |
| Castletownsend, | S. W. | 5 | 1·493 | 55 ·0 | 57 ·0 | 41 ·0 | S. W. | 3 | 1·378 | 56 ·0 | 10 | ·85 |

| Station. | JUNE 12, 9 P. M. | | | | | | JUNE 15, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | N. | 1 | 1·558 | 52°·0 | 57°·0 | 46°·0 | S. | 3 | 1·687 | 54°·1 | 10 | ·31 |
| Buncrana, . . . | E. S. E. | 2 | 1·593 | 48 ·1 | 59 ·0 | 46 ·0 | S. W. | 4 | 1·663 | 53 ·6 | 10 | ·19 |
| Donaghadee, . | N. N. E. | 3 | 1·510 | 50 ·2 | 59 ·6 | 48 ·0 | S. S. W. | 2 | 1·796 | 54 ·4 | 10 | ·47 |
| Killybegs, . . . | N. | 2 | 1·624 | 51 ·5 | 58 ·8 | 47 ·0 | S. W. | 3 | 1·661 | 55 ·2 | — | ·09 |
| Armagh, . . . . | N. N. W. | 0·5 | 1·557 | 50 ·4 | 58 ·0 | 47 ·0 | S. | 3 | 1·737 | 54 ·8 | 10 | ·10 |
| Killough, . . . | N. | 3 | 1·474 | 52 ·7 | 65 ·0 | 46 ·0 | S. | 3 | 1·817 | 52 ·7 | 9 | ·08 |
| Markree, . . . | N. N. W. | 1 | 1·622 | 48 ·5 | 59 ·0 | 48 ·6 | S. S. W. | 4 | 1·694 | 57 ·1 | 10 | ·10 |
| Westport, . . . | N. | 2 | 1·676 | 51 ·0 | — | — | W. | 5 | 1·681 | 57 ·0 | — | ·06 |
| Dublin, . . . . | N. W. | 2 | 1·479 | 59 ·5 | 66 ·7 | 48 ·5 | S. S. W. | 1 | 1·842 | 58 ·4 | 10 | ·00 |
| Courtown, . . . | S. W. | 1 | 1·487 | 57 ·0 | 61 ·5 | 49 ·3 | S. S. W. | 2 | 1·900 | 56 ·3 | 10 | ·02 |
| Kilrush, . . . . | N. | 1 | 1·563 | 53 ·8 | 65 ·0 | 45 ·5 | W. S. W. | 5 | 1·764 | 55 ·8 | 10 | ·18 |
| Dunmore, . . . | W. | 2 | 1·521 | 54 ·8 | 57 ·5 | 50 ·5 | S. W. | 4 | 1·888 | 56 ·3 | — | ·03 |
| Cahirciveen, . . | N. | 3 | 1·625 | 53 ·0 | — | 49 ·2 | S. W. | 3 | 1·811 | 56 ·4 | 10 | ·67 |
| Castletownsend, | W. | 2 | 1·555 | 56 ·5 | 61 ·5 | 49 ·0 | S. W. | 5 | 1·874 | 55 ·5 | 10 | ·40 |

REMARKS.

June 11, 9 P. M.—Heavy rain throughout the island.
June 12, 9 A. M.—Light rain at most of the stations.
June 12, 9 P. M.—Rain at Armagh, Killough, and Castletownsend; light rain at Donaghadee and Killybegs.
June 15, 9 A. M.—Rain throughout the island; heavy rain in south-west.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | JUNE 15, 9 P.M. | | | | | | JUNE 16, 9 A.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 3 | 1·586 | 53°·9 | 61°·0 | 51°·0 | W. | 5 | 1·727 | 53°·7 | 9 | ·14 |
| Buncrana, . . . | W. | 4 | 1·565 | 53 ·9 | 62 ·0 | 52 ·0 | N. W. | 5 | 1·785 | 55 ·4 | 8 | ·04 |
| Donaghadee, . | W. S. W. | 3 | 1·635 | 54 ·6 | 61 ·4 | 52 ·5 | N. W. | 5 | 1·742 | 57 ·4 | 9 | ·11 |
| Killybegs, . . . | S. W. | 5 | 1·658 | 54 ·5 | 61 ·2 | 52 ·4 | W. | 5 | 1·870 | 56 ·7 | — | ·10 |
| Armagh, . . . | S. W. | 2·8 | 1·655 | 54 ·9 | 63 ·4 | 52 ·5 | W. | 3·5 | 1·824 | 56 ·1 | 7 | ·08 |
| Killough, . . . | S. | 3 | 1·930? | 52 ·8 | 64 ·0 | 51 ·0 | S. W. | 3 | 2·167? | 55 ·7 | 4 | ·10 |
| Markree, . . . | W. | 3 | 1·679 | 52 ·8 | 62 ·4 | 52 ·4 | W. | 4 | 1·911 | 56 ·7 | 9 | ·01 |
| Westport, . . . | W. | 5 | 1·681 | 56 ·0 | — | — | W. | 5 | 1·909 | 55 ·0 | — | ·02 |
| Dublin, . . . . | S. W. | 3 | 1·730 | 55 ·0 | 64 ·2 | 53 ·0 | S. W. | 3 | 1·881 | 59 ·1 | 10 | ·16 |
| Courtown, . . | W. S. W. | 2 | 1·779 | 55 ·5 | 64 ·0 | 54 ·5 | W. | 4 | 1·890 | 57 ·5 | 4 | ·22 |
| Kilrush, . . . . | W. | 4 | 1·814 | 53 ·8 | 58 ·0 | 50 ·5 | W. N. W. | 5 | 1·813 | 55 ·8 | 4 | ·00 |
| Dunmore, . . . | W. S. W. | 2 | 1·826 | 54 ·3 | 60 ·0 | 55 ·0 | W. | 2 | 1·978 | 59 ·3 | — | ·26 |
| Cahirciveen, . | W. | 3 | 1·821 | 56 ·0 | — | 53 ·4 | W. | 3 | 2·048 | 57 ·3 | 2 | ·08 |
| Castletownsend, | S. W. | 4 | 1·872 | 56 ·0 | 60 ·0 | 53 ·0 | W. S. W. | 4 | 2·023 | 59 ·0 | 7 | ·42 |

| Station. | JULY 13, 9 A.M. | | | | | | JULY 13, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 3 | 1·503 | 60°·3 | 10 | ·08 | S. W. | 3 | 1·038 | 59°·9 | 66°·0 | 54°·0 |
| Buncrana, . . . | S. W. | 5 | 1·474 | 61 ·1 | 10 | ·15 | W. S. W. | 5 | 1·075 | 58 ·6 | — | 56 ·5 |
| Donaghadee, . | S. W. | 2 | 1·613 | 64 ·4 | 10 | ·05 | S. W. | 3 | 1·143 | 59 ·9 | 67 ·0 | 58 ·6 |
| Killybegs, . . . | S. S. W. | 5 | 1·501 | 60 ·0 | — | ·14 | S. W. | 5 | 1·042 | 58 ·1 | — | — |
| Armagh, . . . | S. W. | 3 | 1·568 | 62 ·7 | 10 | ·15 | S. S. W. | 4 | 1·091 | 59 ·0 | 65 ·3 | 58 ·6 |
| Killough, . . . | S. W. | 3 | 1·476 | 57 ·0 | 7 | ·10 | S. W. | 6 | — | 54 ·4 | 68 ·0 | 51 ·0 |
| Markree, . . . | S. S. W. | 4 | 1·479 | 61 ·1 | 10 | ·03 | S. | 4 | 1·032 | 57 ·0 | 65 ·8 | 58 ·4 |
| Westport, . . . | S. W. | 6 | 1·460 | 63 ·0 | — | ·25 | W. | 6 | 1·082 | 58 ·0 | — | — |
| Dublin, . . . . | S. | 4 | 1·656 | 70 ·6 | 7 | ·00 | S. W. | 3 | 1·209 | 62 ·5 | 73 ·2 | 60 ·5 |
| Courtown, . . | S. W. | 1 | 1·721 | 66 ·5 | 7 | ·00 | S. W. | 4 | 1·311 | 61 ·3 | 69 ·5 | 59 ·5 |
| Kilrush, . . . . | S. W. | 5 | 1·590 | 62 ·8 | 10 | ·00 | S. W. | 5 | 1·308 | 59 ·8 | 64 ·0 | 56 ·5 |
| Dunmore, . . . | S. W. | 2 | 1·756 | 65 ·8 | — | ·00 | S. W. | 3 | 1·345 | 60 ·8 | 62 ·0 | 59 ·5 |
| Cahirciveen, . | S. W. | 3 | 1·664 | 62 ·2 | 10 | ·00 | W. | 5 | 1·349 | 59 ·2 | — | 60 ·4 |
| Castletownsend, | S. W. | 3 | 1·779 | 63 ·0 | 10 | ·00 | W. | 5 | 1·423 | 58 ·5 | 65 ·0 | 59 ·0 |

REMARKS.

June 15, 9 P.M.—Light rain, chiefly in north-west.
July 13, 9 A.M.—Rain in north and north-west.
July 13, 9 P.M.—Gale highest at 1 P.M. at Cahirciveen, and at 2 P.M. at Donaghadee. Rain at Portrush, Buncrana, Killough, and Westport; light rain at Dublin and Dunmore.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | JULY 14, 9 A. M. | | | | | | JULY 27, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | W. | 4 | 1·058 | 54°·3 | 10 | ·56 | — | 0 | 1·827 | 58°·0 | 9 | ·04 |
| Buncrana, . . . | N. W. | 6 | 1·182 | 53 ·6 | 10 | ·41 | S. W. | 1 | 1·884 | 61 ·1 | 7 | ·24 |
| Donaghadee, . | W. | 4 | 1·112 | 56 ·4 | 10 | ·36 | W. S. W. | 1 | 1·864 | 60 ·4 | 9 | ·02 |
| Killybegs, . . . | W. | 6 | 1·256 | 56 ·7 | — | ·36 | S. | 2 | 1·823 | 60 ·9 | — | ·09 |
| Armagh, . . . . | W. | 3 | 1·204 | 54 ·3 | 10 | ·47 | S. | 0·5 | 1·841 | 58 ·9 | 7 | ·00 |
| Killough, . . . | W. | 6 | 1·251 | 52 ·6 | 10 | ·15 | W. | 0 | 1·856 | 57 ·3 | 2 | ·01 |
| Markree, . . . | W. | 5 | 1·334 | 54 ·9 | 9 | ·45 | S. E. | 2 | 1·795 | 57 ·8 | 10 | ·02 |
| Westport, . . | N. W. | 6 | 1·376 | 58 ·0 | — | ·32 | S. E. | 3 | 1·745 | 54 ·0 | — | ·10 |
| Dublin, . . . . | S. W. | 4 | 1·312 | 60 ·9 | 10 | ·14 | S. E. | 1 | 1·854 | 60 ·9 | 4 | ·00 |
| Courtown, . . . | W. S. W. | 4 | 1·418 | 61 ·0 | 8 | ·21 | E. S. E. | 1 | 1·866 | 61 ·0 | 8 | ·00 |
| Kilrush, . . . . | W. N. W. | 5 | 1·513 | 57 ·8 | 5 | ·20 | S. | 2 | 1·757 | 55 ·8 | 10 | ·05 |
| Dunmore, . . . | W. | 3 | 1·465 | 61 ·3 | — | ·22 | S. | 2 | 1·828 | 63 ·8 | — | ·00 |
| Cahirciveen, . . | W. | 4 | 1·577 | 60 ·0 | 6 | ·48 | S. S. W. | 3 | 1·684 | 58 ·4 | 10 | ·14 |
| Castletownsend, | W. | 5 | 1·589 | 63 ·0 | 8 | ·50 | E. S. E. | 3 | 1·740 | 57 ·5 | 10 | ·23 |

| Station. | JULY 27, 9 P. M. | | | | | | JULY 28, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. E. | 2 | 1·626 | 56°·3 | 66°·0 | 53°·0 | S. W. | 3 | 1·553 | 60°·9 | 8 | ·36 |
| Buncrana, . . . | S. S. E. | 2 | 1·578 | 56 ·6 | — | 53 ·0 | S. S. W. | 2 | 1·551 | 62 ·6 | 8 | ·35 |
| Donaghadee, . | S. E. | 3 | 1·671 | 55 ·0 | 65 ·5 | 53 ·0 | S. S. W. | 2 | 1·603 | 63 ·4 | 10 | ·33 |
| Killybegs, . . . | S. W. | 3 | 1·594 | 59 ·3 | — | — | W. | 2 | 1·613 | 61 ·4 | — | ·06 |
| Armagh, . . . | S. S. E. | 1 | 1·607 | 57 ·9 | 63 ·6 | 48 ·4 | S. S. W. | 3·5 | 1·585 | 61 ·4 | 8 | ·50 |
| Killough, . . . | S. W. | 3 | 1·747 | 55 ·4 | 63 ·0 | 50 ·0 | S. W. | 3 | 1·625 | 60 ·4 | 6 | ·14 |
| Markree, . . . | S. | 2 | 1·559 | 57 ·7 | 65 ·4 | 45 ·6 | S. S. W. | 2 | 1·579 | 65 ·2 | 9 | ·59 |
| Westport, . . . | W. | 4 | 1·583 | 61 ·0 | — | — | W. | 3 | 1·580 | 59 ·0 | — | ·41 |
| Dublin, . . . . | S. S. E. | 3 | 1·664 | 63 ·2 | 71 ·4 | 50 ·0 | S. | 2 | 1·634 | 70 ·2 | 4 | ·16 |
| Courtown, . . . | S. S. W. | 2 | 1·713 | 61 ·2 | 66 ·3 | 49 ·5 | S. S. W. | 3 | 1·662 | 64 ·2 | 5 | ·12 |
| Kilrush, . . . . | W. S. W. | 3 | 1·630 | 61 ·8 | 64 ·0 | 48 ·5 | W. S. W. | 2 | 1·597 | 61 ·8 | 8 | ·32 |
| Dunmore, . . . | S. W. | 4 | 1·707 | 61 ·8 | 63 ·5 | 58 ·0 | W. S. W. | 2 | 1·671 | 62 ·8 | — | ·20 |
| Cahirciveen, . . | S. W. | 3 | 1·595 | 61 ·6 | — | 52 ·8 | S. W. | 3 | 1·597 | 62 ·4 | 10 | ·42 |
| Castletownsend, | S. W. | 5 | 1·446 | 61 ·0 | 65 ·0 | 52 ·5 | S. W. | 5 | 1·631 | 62 ·5 | 9 | ·19 |

REMARKS.

July 14, 9 A. M.—Rain throughout the north.
July 27, 9 A. M.—Rain along west coast. Arch in N. W. observed at Markree.
July 27, 9 P. M.—Lightning seen in north-west at Donaghadee. Rain throughout island.
July 28, 9 A. M.—Solar eclipse in the afternoon of this day; clouds of slate colour, as observed at Markree, at time of greatest obscuration. Showers on west coast.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | August 23, 9 P. M. | | | | | | August 24, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. W. | 2 | 1·684 | 54° 9 | 64°·0 | 55°·0 | S. E. | 1 | 1·593 | 52°·4 | 10 | ·14 |
| Buncrana, . . | W. S. W. | 3 | 1·663 | 55 ·6 | — | 56 ·0 | S. | 1 | 1·587 | 53 ·1 | 10 | ·18 |
| Donaghadee, . | W. S. W. | 2 | 1·717 | 54 ·9 | 67 ·0 | 55 ·0 | E. S. E. | 3 | 1·545 | 52 ·9 | 10 | ·59 |
| Killybegs, . . | W. | 4 | 1·728 | 57 ·3 | — | — | N. | 3 | 1·584 | 47 ·7 | — | ·41 |
| Armagh, . . . | S. W. | 1·6 | 1·746 | 53 ·1 | 66 ·4 | 55 ·1 | N. E. | 2·2 | 1·439 | 50 ·7 | 10 | ·30 |
| Killough, . . . | S. W. | 3 | 1·772 | 57 ·4 | 63 ·0 | 56 ·0 | S. E. | 3 | 1·737? | 57 ·0 | 8 | ·62 |
| Markree, . . . | S. S. E. | 1 | 1·736 | 51 ·2 | 65 ·5 | 53 ·2 | N. N. W. | 2 | 1·539 | 46 ·6 | 10 | ·88 |
| Westport, . . . | W. | 3 | 1·747 | 58 ·0 | — | — | N. W. | 2 | 1·603 | 53 ·0 | — | ·77 |
| Courtown, . . | S. W. | 1 | 1·815 | 56 ·5 | 73 ·3 | 54 ·3 | S. W. | 4 | 1·523 | 59 ·2 | 5 | ·30 |
| Kilrush, . . . . | W. | 3 | 1·850 | 54 ·8 | 63 ·0 | 57 ·5 | N. W. | 5 | 1·630 | 51 ·8 | 10 | ·57 |
| Dunmore, . . . | W. | 1 | 1·845 | 56 ·8 | 60 ·5 | 57 ·0 | W. | 5 | 1·588 | 59 ·8 | — | ·37 |
| Cahirciveen, . | W. | 2 | 1·827 | 57 ·2 | — | 58 ·5 | W. N. W. | 4 | 1·700 | 57 ·4 | 4 | ·88 |
| Castletownsend, | S. W | 5 | 1·860 | 57 ·0 | 68 ·0 | 59 ·5 | W. | 5 | 1·677 | 57 ·5 | 5 | ·35 |

| Station. | August 24, 9 P. M. | | | | | | September 29, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | N. | 2 | 1·823 | 55°·1 | 57°·0 | 49°·0 | S. E. | 2 | 1·531 | 52°·2 | 10 | ·02 |
| Buncrana, . . | N. | 2 | 1·772 | 53 ·6 | — | 51 ·0 | S. | 4 | 1·482 | 51 ·6 | 10 | ·14 |
| Donaghadee, . | W. N. W. | 2 | 1·773 | 50 ·2 | 61 ·3 | 50 ·0 | S. S. E. | 3 | 1·577 | 53 ·9 | 10 | ·03 |
| Killybegs, . . . | N. W. | 2 | 1·890 | 55 ·0 | — | — | S. E. | 5 | 1·373 | 52 ·0 | — | ·06 |
| Armagh, . . . | W. | 1 | 1·838 | 50 ·8 | 57 ·2 | 49 ·7 | S. W. | 3 | 1·485 | 51 ·3 | 10 | ·09 |
| Killough, . . . | N. | 3 | 1·817 | 52 ·7 | 64 ·0 | 49 ·0 | S. E. | 6 | 1·244? | 48 ·4 | 10 | ·08 |
| Markree, . . . | N. W. | 2 | 1·922 | 50 ·5 | 60 ·0 | 50 ·2 | S. E. | 5 | 1·286 | 51 ·0 | 10 | ·16 |
| Westport, . . . | N. | 3 | 1·896 | 57 ·0 | — | — | S. E. | 5 | 1·215 | 54 ·0 | — | ·70 |
| Dublin, . . . . | — | — | — | — | — | — | S. E. | 2 | 1·478 | 52 ·7 | 10 | ·05 |
| Courtown, . . | W. S. W. | 2 | 1·851 | 54 ·5 | 63 ·0 | 50 ·0 | S. E. | 5 | 1·513 | 53 ·5 | 10 | ·11 |
| Kilrush, . . . | N. W. | 3 | 1·946 | 54 ·8 | 62 ·0 | 46 ·5 | S. | 5 | 1·109 | 58 ·8 | 6 | ·04 |
| Dunmore, . . . | W. N. W. | 2 | 1·914 | 56 ·3 | 72 ·5? | 55 ·0 | S. | 5 | 1·349 | 56 ·3 | — | ·25 |
| Cahirciveen, . | N. W. | 2 | 1·988 | 57 ·6 | — | 53 ·6 | S. | 5 | 1·032 | 59 ·5 | 10 | ·93 |
| Castletownsend, | W. | 2 | 1·921 | 57 ·5 | 66 ·0 | 55 ·0 | S. W. | 5 | 1·120 | 60 ·5 | 10 | ·40 |

REMARKS.

Aug. 23, 9 P. M.—Lightning observed throughout the eastern coast during the day. Rain at Killough and Castletownsend; showers at Killybegs, Westport, and Courtown.

Aug. 24, 9 A. M.—At Courtown gale commenced at 5 A. M., and ended at 2 P. M. Rain throughout island, but chiefly in north.

Aug. 24, 9 P. M.—Aurora observed at several places. Showers in north.

Sept. 29, 9 A. M.—Gale highest in the south-west at 3 A. M. Rain throughout the island.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | SEPTEMBER 29, 9 P. M. | | | | | | SEPTEMBER 30, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. E. | 2 | 1·271 | 54°·0 | 58°·0 | 48°·0 | S. | 2 | 1·020 | 56°·4 | 10 | ·16 |
| Buncrana, . . . | S. | 5 | 1·287 | 53 ·6 | — | 49 ·0 | W. S. W. | 3 | 1·056 | 56 ·1 | 10 | ·59 |
| Donaghadee, . | S. E. | 5 | 1·315 | 51 ·0 | 60 ·0 | 50 ·0 | S. S. W. | 3 | 1·106 | 57 ·8 | 10 | ·25 |
| Killybegs, . . . | N. N. E. | 5 | 1·162 | 54 ·1 | — | — | W. N. W. | 5 | 1·148 | 55 ·9 | — | 1·02 |
| Armagh, . . . . | S. E. | 3·5 | 1·178 | 53 ·8 | 54 ·3 | 49 ·5 | S. W. | 2·5 | 1·107 | 55 ·0 | 10 | ·50 |
| Killough, . . . | S. | 6 | 1·149 | 48 ·1 | 57 ·0 | 45 ·0 | S. | 2 | 1·157 | 55 ·0 | 8 | ·37 |
| Markree, . . . . | N. E. | 1 | 1·030 | 54 ·5 | 56 ·3 | 46 ·8 | W. | 4 | 1·200 | 52 ·9 | 10 | ·79 |
| Westport, . . . | N. E. | 3 | 1·132 | 56 ·0 | 57 ·0 | 50 ·0 | N. W. | 5 | 1·265 | 55 ·0 | — | ·30 |
| Dublin, . . . . | S. E. | 4 | 1·134 | 55 ·9 | 58 ·0 | 51 ·5 | S. W. | 3 | 1·209 | 55 ·6 | 10 | ·78 |
| Courtown, . . . | S. S. E. | 5 | 1·147 | 56 ·5 | 58 ·5 | 46 ·0 | W. S. W. | 2 | 1·270 | 56 ·5 | 8 | ·48 |
| Kilrush, . . . . | N. N. W. | 4 | 1·138 | 57 ·8 | 63 ·0 | 50 ·5 | N. W. | 4 | 1·402 | 53 ·8 | 10 | ·03 |
| Dunmore, . . . | S. | 3 | 1·089 | 58 ·3 | — | 50 ·0 | W. | 2 | 1·325 | 57 ·3 | — | ·20 |
| Cahirciveen, . | N. W. | 3 | 1·225 | 56 ·6 | 61 ·4 | 52 ·2 | N. W. | 2 | 1·400 | 54 ·6 | 6 | ·35 |
| Castletownsend, | W. S. W. | 3 | 1·194 | 57 ·5 | 63 ·0 | 51 ·0 | S. W. | 3 | 1·374 | 55 ·5 | 6 | ·00 |

| Station. | SEPTEMBER 30, 9 P. M. | | | | | | OCTOBER 1, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 1 | 1·178 | 50°·2 | 59°·0 | 50°·0 | S. E. | 3 | 0·855 | 54°·4 | 10 | ·28 |
| Buncrana, . . . | S. W. | 3 | 1·185 | 51 ·1 | — | 50 ·0 | S. S. E. | 1 | 0·889 | 50 ·6 | 10 | ·45 |
| Donaghadee, . | S. S. W. | 1 | 1·240 | 51 ·8 | 59 ·5 | 53 ·0 | S. S. E. | 4 | 0.936 | 54 ·9 | 10 | ·07 |
| Killybegs, . . . | E. S. E. | 5 | 0·973 | 53 ·3 | — | — | W. N. W. | 3 | 0·873 | 52 ·7 | — | .03 |
| Armagh, . . . | S. | 2 | 1·189 | 49 ·8 | 57 ·3 | 50 ·8 | S. S. W. | 2·5 | 0·846 | 52 ·0 | 10 | ·72 |
| Killough, . . | S. | 3 | 1·172 | 55 ·1 | 59 ·0 | 47 ·0 | S. | 6 | — | 54 ·4 | 10 | ·47 |
| Markree, . . . . | S. E. | 4 | 1·048 | 50 ·0 | 57 ·6 | 53 ·2 | W. | 0 | 0·834 | 53 ·0 | 10 | ·11 |
| Westport, . . . | S. | 3 | 1·062 | 56 ·0 | 57 ·0 | 53 ·0 | N. | 2 | 0·882 | 52 ·5 | — | ·30 |
| Dublin, . . . . | S. | 2 | 1·231 | 51 ·4 | 58 ·7 | 52 ·2 | S. | 0 | 0·838 | 54 ·0 | 10 | ·33 |
| Courtown, . . | S. | 1 | 1·275 | 52 ·2 | 59 ·7 | 53 ·3 | S. | 1 | 0·844 | 52 ·0 | 10 | 1·03 |
| Kilrush, . . . . | S. S. E. | 3 | 1·142 | 53 ·8 | 58 ·0 | 47 ·5 | N. N. W. | 2 | 0·912 | 49 ·3 | 5 | ·53 |
| Dunmore, . . . | — | — | — | — | 60 ·0 | 56 ·0 | S. S. W. | 1 | 0·831 | 53 ·8 | — | 1·97 |
| Cahirciveen, . . | — | 3 | 1·094 | 56 ·3 | 58 ·6 | 52 ·2 | N. N. W. | 2 | 0·923 | 51 ·4 | 10 | ·79 |
| Castletownsend, | S. W. | 5 | 1·173 | 57 ·0 | 62 ·5 | 52 ·5 | W. | 2 | 0·892 | 54 ·5 | 5 | ·82 |

REMARKS.

Sept. 29, 9 P. M.—Wind fell at 7 P. M. at Markree. Aurora. Rain throughout, except south-western quarter.

Sept. 30, 9 A. M.—Rain, for the most part light, at Buncrana, Killough, Armagh, Markree, and Kilrush.

Sept. 30, 9 P. M.—Gale commenced at 8 P. M. at Markree. Rain in south-west.

Oct. 1, 9 A. M.—Rain, chiefly in north and east.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | October 1, 9 P. M. | | | | | | October 4, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | W. | 2 | 0·853 | 49°·9 | 56°·0 | 47°·0 | S. W. | 2 | 1·309 | 50°·0 | 1 | ·10 |
| Buncrana, . . . | W. S. W. | 2 | 0·898 | 49 ·6 | — | 44 ·0 | W. S. W. | 3 | 1·314 | 50 ·6 | 3 | ·15 |
| Donaghadee, . | S. W. | 1 | 0·901 | 48 ·9 | 57 ·3 | 50 ·5 | W. S. W. | 1 | 1·472? | 51 ·2 | 1 | ·13 |
| Killybegs, . . . | W. N. W. | 2 | 0·916 | 49 ·7 | — | — | S. S. W. | 3 | 1·347 | 53 ·0 | — | ·30 |
| Armagh, . . . | S. W. | 1 | 0·927 | 45 ·0 | 52 ·7 | 49 ·7 | S. W. | 2 | 1·270 | 50 ·2 | 0 | ·11 |
| Killough, . . . | W. | 2 | — | 53 ·7 | 58 ·0 | 48 ·0 | S. | 2 | 1·386 | 51 ·7 | 7 | ·04 |
| Markree, . . . | S. | 3 | 0·900 | 50 ·3? | 55 ·0 | 49 ·3 | S. S. W. | 4 | 1·304 | 51 ·8 | 3 | ·13 |
| Westport, . . . | W. | 5 | 0·912 | 52 ·5 | 56 ·0 | 50 ·0 | S. W. | 5 | 1·304 | 52 ·5 | — | ·50 |
| Dublin, . . . . | S. W. | 2 | 0·980 | 44 ·1 | 57 ·0 | 53 ·2 | S. W. | 2 | 1·406 | 51 ·9 | 0 | ·25 |
| Courtown, . . | W. | 1 | 1·012 | 43 ·0 | 55 ·0 | 51 ·7 | S. W. | 2 | 1·480 | 50 ·3 | 2 | ·14 |
| Kilrush, . . . . | W. N. W. | 4 | 1·045 | 49 ·8 | 56 ·0 | 45 ·5 | S. W. | 5 | 1·468 | 49 ·8 | 8 | ·48 |
| Dunmore, . . . | W. N. W. | 1 | 1·031 | 48 ·3 | — | 54 ·0 | W. S. W. | 2 | 1·477? | 53 ·3 | — | ·35 |
| Cahirciveen. . . | W. | 2 | 1·056 | 49 ·6 | 55 ·4 | 50 ·0 | W. S. W. | 4 | 1·457 | 52 ·2 | 5 | ·27 |
| Castletownsend, | S. W. | 2 | 1·092 | 48 ·5 | 61 ·0 | 49 ·5 | W. | 5 | 1·600 | 53 ·5 | 5 | ·25 |

| Station. | October 4, 9 P. M. | | | | | | October 5, 9 A. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Max. | Min. | Wind. | | Barom. | Therm. | Cloud. | Rain. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 1 | 1·182 | 46°·2 | 58°·0 | 47°·0 | W. | 4 | 1·346 | 51°·0 | 10 | ·40 |
| Buncrana, . . . | S. W. | 2 | 1·201 | 47 ·6 | — | 47 ·0 | N. W. | 5 | 1·391 | 51 ·1 | 8 | ·57 |
| Donaghadee, . | S. W. | 1 | 1·236 | 48 ·9 | 57 ·4 | 49 ·5 | W. N. W. | 2 | 1·371 | 49 ·4 | 10 | ·08 |
| Killybegs, . . . | W. N. W. | 4 | 1·208 | 51 ·0 | — | — | W. N. W. | 6 | 1·458 | 53 ·1 | — | ·43 |
| Armagh, . . . | S. S. W. | 0·5 | 1·225 | 47 ·2 | 56 ·3 | 46 ·8 | W. | 1·5 | 1·439 | 50 ·8 | 8 | ·22 |
| Killough, . . . | S. | 3 | 1·418 | 49 ·0 | 57 ·0 | 47 ·0 | W. | 2 | 1·573 | 51 ·7 | 4 | ·20 |
| Markree, . . . | W. | 4 | 1·245 | 46 ·6 | 54 ·2 | 44 ·6 | W· | 3 | 1·528 | 48 ·6 | 3 | ·86 |
| Westport, . . . | N. | 6 | 1·276 | 53 ·0 | 54 ·0 | 51 ·0 | N. W. | 6 | 1·520 | 53 ·5 | — | ·56 |
| Dublin, . . . . | S. W. | 3 | 1·260 | 48 ·0 | 59 ·2 | 49 ·0 | W. | 2 | 1·502 | 49 ·4 | 4 | ·14 |
| Courtown, . . . | W. S. W. | 1 | 1·345 | 48 ·0 | 57 ·0 | 46 ·5 | S. W. | 2 | 1·574 | 49 ·5 | 7 | ·11 |
| Kilrush, . . . . | W. N. W. | 5 | 1·423 | 46 ·8 | 54 ·0 | 43 ·5 | N. W. | 5 | 1·720 | 47 ·8 | 8 | ·32 |
| Dunmore, . . . | W. | 2 | 1·380 | 51 ·3 | 58 ·0 | — | W. S. W. | 2 | 1·633 | 51 ·8 | — | ·25 |
| Cahirciveen, . . | W. | 3 | 1·461 | 51 ·6 | 54 .8 | 50 ·2 | W. | 3 | 1·728 | 52 ·0 | 9 | ·43 |
| Castletownsend, | W. | 5 | 1·426 | 53 ·5 | 57 ·0 | 49 ·0 | W. | 3 | 1·691 | 57 ·5 | 10 | ·40 |

REMARKS.

Oct. 1, 9 P. M.—Aurora observed in several places. Rain, chiefly in south-west.
Oct. 4, 9 A. M.—Rain, chiefly in south-west; hail and rain at Castletownsend.
Oct. 4, 9 P. M.—Lightning observed throughout Ireland during this day. Rain at Kilrush and Dunmore; hail and rain at Westport and Castletownsend.
Oct. 5, 9 A. M.—Lightning observed at Cahirciveen. Showers, chiefly on west coast.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | DECEMBER 7, 9 A.M. | | | | | | DECEMBER 7, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 2 | 1·940 | 51°·3 | 10 | ·02 | S. | 4 | 1·364 | 49°·5 | 53°·0 | 46°·0 |
| Buncrana, . . | S. W. | 3 | 1·906 | 51 ·1 | 9 | ·00 | S. S. W. | 5 | 1·494 | 49 ·6 | — | 46 ·0 |
| Donaghadee, . | S. S. W. | 2 | 1·970 | 50 ·4 | 10 | ·00 | S. S. W. | 5 | 1·541 | 50 ·4 | 52 ·0 | 47 ·0 |
| Killybegs, . . | S. W. | 2 | 1·902 | 51 ·3 | — | ·10 | S. S. W. | 6 | 1·225 | 52 ·9 | — | — |
| Armagh, . . . | S. W. | 3·5 | 1·941 | 51 ·0 | 10 | ·01 | S. | 6 | 1·423 | 50 ·0 | 52 ·5 | 46 ·4 |
| Killough, . . . | S. W. | 2 | 2·031 | 50 ·4 | 6 | ·05 | S. W. | 6 | 1·570 | 49 ·2 | 52 ·0 | 46 ·0 |
| Markree, . . . | S. S. W. | 3 | 1·852 | 50 ·6 | 10 | ·03 | S. S. W. | 6 | 1·274 | 51 ·5 | 53 ·3 | 47 ·4 |
| Westport, . . . | S. W. | 5 | 1·815 | 55 ·0 | — | ·07 | S. W. | 6 | 1·301? | 57 ·0 | 58 ·0 | 51 ·0 |
| Dublin, . . . . | S. S. W. | 2 | 1·997 | 51 ·6 | 6 | ·00 | — | 3 | 1·560 | 52 ·8 | 57 ·0 | 48 ·8 |
| Courtown, . . | S. S. W. | 3 | 2·058 | 51 ·0 | 10 | ·01 | S. | 5 | 1·666 | 50 ·5 | 54 ·0 | 48 ·0 |
| Kilrush, . . . . | S. S. W. | 3 | 1·966 | 51 ·8 | 10 | ·03 | S. S. W. | 5 | 1·448 | 53 ·8 | 55 ·0 | 51 ·5 |
| Dunmore, . . . | S. S. W. | 3 | 2·016 | 50 ·8 | — | ·03 | S. | 5 | 1·638 | 50 ·8 | 52 ·5 | — |
| Cahirciveen, . | S. | 4 | 1·962 | 52 ·3 | 10 | ·20 | W. | 4 | 1·603 | 53 ·0 | 55 ·4 | 50 ·8 |
| Castletownsend, | S. W. | 5 | 2·033 | 51 ·5 | 10 | ·11 | S. S. W. | 5 | 1·579 | 53 ·5 | 57 ·5 | 50 ·0 |

| Station. | DECEMBER 9, 9 A.M. | | | | | | DECEMBER 9, 9 P.M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 3 | 1·781 | 52°·0 | 10 | ·10 | S. | 3 | 1·667 | 55°·5 | 58°·0 | 41°·0 |
| Buncrana, . . . | S. W. | 3 | 1·761 | 53 ·6 | 9 | ·06 | S. W. | 4 | 1·677 | 55 ·1 | — | 43 ·0 |
| Donaghadee, . | S. S. W. | 3 | 1·895 | 49 ·9 | 10 | ·05 | S. S. W. | 3 | 1·760 | 52 ·9 | — | 42 ·4 |
| Killybegs, . . | S. W. | 5 | 1·762 | 54 ·0 | — | ·18 | S. W. | 5 | 1·667 | 54 ·5 | — | — |
| Armagh, . . . | S. S. W. | 4·5 | 1·767 | 53 ·1 | 10 | ·11 | S. | 4 | 1·726 | 54 ·5 | 57 ·4 | 41 ·8 |
| Killough, . . . | W. | 2 | 1·747 | 48 ·7 | 3 | ·04 | S. W. | 2 | 1·787 | 47 ·4 | 50 ·0 | 45 ·0 |
| Markree, . . . | S. W. | 4 | 1·770 | 54 ·6 | 10 | ·05 | S. S. W. | 4 | 1·625 | 55 ·0 | 55 ·7 | 41 ·7 |
| Westport, . . . | S. W. | 5 | 1·696 | 58 ·0 | — | ·04 | W. | 6 | 1·604 | 58 ·0 | 59 ·0 | 49 ·0 |
| Dublin, . . . . | S. S. W. | 2 | 1·885 | 57 ·5 | 10 | ·01 | S. S. W. | 2 | 1·834 | 55 ·8 | 59 ·6 | 45 ·0 |
| Courtown, . . | S. S. W. | 3 | 1·970 | 53 ·3 | 10 | ·02 | S. S. W. | 4 | 1·867 | 53 ·5 | 56 ·0 | 37 ·5 |
| Kilrush, . . . | W. S. W. | 4 | 1·893 | 55 ·8 | 10 | ·00 | S. W. | 4 | 1·750 | 54 ·8 | 57 ·0 | 48 ·5 |
| Dunmore, . . . | S. S. W. | 2 | 1·997 | 52 ·8 | — | ·03 | S. S. W. | 5 | 1·883 | 52 ·8 | 53 ·5 | — |
| Cahirciveen, . | S. W. | 4 | 1·913 | 56 ·2 | 10 | ·25 | S. S. W. | 6 | 1·780 | 55 ·4 | 57 ·4 | 49 ·0 |
| Castletownsend, | S. W. | 5 | 1·980 | 54 ·0 | 10 | ·04 | S. W. | 5 | 1·865 | 54 ·0 | 53 ·0 | 45 ·0 |

REMARKS.

Dec. 7, 9 A.M.—Rain at Killough; light rain at Markree and Kilrush.
Dec. 7, 9 P.M.—Storm lasted from 6 P.M. to 9 P.M. in the south; least pressure at 7 P.M. at Cahirciveen. Lightning observed at Buncrana in south-west. Rain at most of the stations.
Dec. 9, 9 A.M.—Light rain, chiefly on west coast.
Dec. 9, 9 P.M.—Lunar halo observed at Donaghadee. Light rain, chiefly on west coast.

TABLE XXXIII. (*continued*). SELECTED OBSERVATIONS.

| Station. | DECEMBER 20, 9 A. M. | | | | | | DECEMBER 20, 9 P. M. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wind. | | Barom. | Therm. | Cloud. | Rain. | Wind. | | Barom. | Therm. | Max. | Min. |
| | Direction. | Force | | | | | Direction. | Force | | | | |
| Portrush, . . . | S. | 3 | 1·676 | 49°·8 | 9 | ·00 | S. | 3 | 1·442 | 51°·4 | 54°·0 | 38°·0 |
| Buncrana, . . . | S. S. W. | 4 | 1·717 | 51 ·1 | 10 | ·00 | S. S. W. | 5 | 1·472 | 53 ·6 | — | 42 ·0 |
| Donaghadee, . | S. S. W. | 3 | 1·982 | 49 ·6 | 10 | ·00 | S. W. | 4 | 1·580 | 51 ·0 | — | 42 ·0 |
| Killybegs, . . . | S. S. W. | 5 | 1·641 | 53 ·4 | — | ·00 | N. | 4 | 1·470 | 46 ·3 | — | — |
| Armagh, . . . | S. | 4 | 1·738 | 50 ·2 | 9 | ·02 | S. | 4·5 | 1·480 | 52 ·0 | 53 ·6 | 38 ·0 |
| Killough, . . . | S. | 6 | 1·667 | 48 ·7 | 5 | ·07 | S. | 6 | 1·642 | 48 ·7 | 51 ·0 | 42 ·0 |
| Markree, . . . | S. S. W. | 4 | 1·644 | 51 ·1 | 10 | ·01 | N. W. | 2 | 1·459 | 44 ·6 | 54 ·0 | 40 ·2 |
| Westport, . . . | S. W. | 6 | 1·590 | 58 ·0 | — | ·05 | S. | 0 | 1·491 | 48 ·0 | 59 ·0 | 47 ·0 |
| Dublin, . . . . | S. | 1 | 1·812 | 52 ·1 | 10 | ·00 | S. | 3 | 1·578 | 52 ·8 | 57 ·0 | 35 ·5 |
| Courtown, . . . | S. | 3 | 1·882 | 51 ·5 | 10 | ·02 | S. | 4 | 1·617 | 52 ·5 | 53 ·7 | 45 ·0 |
| Kilrush, . . . . | S. W. | 3 | 1·712 | 53 ·8 | 10 | ·03 | N. W. | 2 | 1·525 | 46 ·8 | 49 ·0 | 46 ·5 |
| Dunmore, . . . | S. S. W. | 5 | 1·847 | 51 ·3 | — | ·02 | S. S. W. | 5 | 1·550 | 52 ·3 | 52 ·5 | — |
| Cahirciveen, . . | S. | 6 | 1·762 | 54 ·5 | 10 | ·25 | S. W. | 2 | 1·580 | 48 ·6 | 51 ·8 | 49 ·8 |
| Castletownsend, | S. W. | 5 | 1·837 | 52 ·0 | 10 | ·10 | S. W. | 5 | 1·559 | 51 ·5 | 55 ·0 | 48 ·0 |

REMARKS.

Dec. 20, 9 A. M.—Rain throughout the island, but chiefly on west coast.
Dec. 20, 9 P. M.—Wind veered from S. S. W. to N. W. at $7^{h}\cdot 30^{m}\cdot$ P. M. at Markree. Rain throughout the island.

NOTE.—At Armagh the velocity of the wind is recorded, in miles per hour, by means of Robinson's anemometer. The numbers so given are, in the preceding Table, reduced to the scale (0 - 6) employed at the other stations. The velocity of the wind was also occasionally observed at Portrush, Markree, Dublin, and Courtown, by means of small anemometers constructed on the same principle.

## Table XXXIV. Hourly Observations.

### Cahirciveen.

Lat. = 51° 56′. Long. = 10° 13′. Height = 52 feet.
Barometric Correction = + 0·081.
Force of Wind expressed in terms of scale (0 – 6).

| Day. | Hour. | Barom. | Therms. | | Wind. | |
|---|---|---|---|---|---|---|
| | | | Dry. | Wet. | Direction. | Force |
| Mar. 21, | 6 A. M. | 0·879 | 50°·6 | .... | S. W. | 3 |
| | 7 | 0·878 | 46 ·0 | | | |
| | 8 | 0·870 | 47 ·0 | | | |
| | 9 | 0·848 | 47 ·2 | .... | W. S. W. | 4 |
| | 10 | 0·780 | 48 ·4 | | | |
| | 11 | 0·777 | 48 ·8 | | | |
| | 12 | 0·780 | 48 ·8 | .... | W. | |
| | 1 P. M. | 0·847 | 49 ·0 | | | |
| | 2 | 0·866 | 49 ·2 | | | |
| | 3 | 0·862 | 49 ·2 | | | |
| | 4 | 0·873 | 49 ·2 | | | |
| | 5 | 0·864 | 49 ·0 | | | |
| | 6 | 0·863 | 48 ·6 | | | |
| | 7 | 0·868 | 47 ·8 | | | |
| | 8 | 0·856 | 47 ·0 | .... | W. S. W. | 3 |
| | 9 | 0·865 | 46 ·8 | .... | W. S. W. | 3 |
| | 10 | 0·861 | 46 ·0 | | | |
| | 11 | 0·860 | 45 ·0 | | | |
| Mar. 22, | 0 | 0·850 | 45 ·0 | .... | S. W. | 2 |
| | 1 A. M. | 0·786 | 44 ·5 | | | |
| | 2 | 0·779 | 44 ·2 | .... | S. S. W. | 1 |
| | 3 | 0·753 | 43 ·8 | .... | S. W. | 1 |
| | 4 | 0·793 | 44 ·0 | | | |
| | 5 | 0·753 | 43 ·6 | .... | N. E. | |
| | 6 | 0·755 | 42 ·8 | .... | N. E. | 1 |

Remarks.

The observations of temperature were taken, by mistake, with one of the registering thermometers.
Cloudy for the most part throughout the day.
Heavy showers from March 21, 6 A. M. to 3 P. M.

### Armagh.

Lat. = 54° 21′. Long. = 6° 39′. Height = 211 feet.
Barometric Correction = + 0·273.
Velocity of Wind expressed in feet per second.

| Barom. | Therms. | | Wind. | | Cloud. | |
|---|---|---|---|---|---|---|
| | Dry. | Wet. | Direction. | Vel. | Amt. | Form. |
| 0·801 | 39°·9 | 38°·5 | S. E. | 18 | 6 | C S, K S |
| 0·786 | 41 ·3 | 40 ·2 | S. E. *b* E. | 18 | 9 | C S, K S |
| 0·769 | 44 ·0 | 42 ·7 | S. E. | 18 | 6 | C S, K S |
| 0·755 | 46 ·3 | 43 ·7 | S. E. | 29 | 9 | K S |
| 0·732 | 46 ·7 | 44 ·0 | S. E. *b* S. | 22 | 10 | K S, N |
| 0·705 | 47 ·1 | 45 ·0 | S. E. | 26 | 8 | K S, N |
| 0·686 | 47 ·5 | 44 ·8 | S. E. | 35 | 9 | K S |
| 0·659 | 47 ·1 | 45 ·2 | S. E. | 35 | 10 | N |
| 0·627 | 48 ·2 | 45 ·7 | S. E. | 29 | 8 | K S, K |
| 0·600 | 48 ·3 | 45 ·9 | S. E. *b* S. | 29 | 10 | N |
| 0·584 | 46 ·3 | 44 ·5 | S. *b* E. | 28 | 10 | N |
| 0·571 | 45 ·5 | 43 ·7 | S. S. E. | 37 | 10 | N |
| 0·566 | 45 ·1 | 43 ·2 | S. S. E. | 32 | 10 | N |
| 0·570 | 44 ·2 | 42 ·8 | S. *b* E. | 32 | 10 | N |
| 0·577 | 44 ·2 | 42 ·8 | S. | 34 | 9 | N |
| 0·585 | 43 ·9 | 42 ·0 | S. | 29 | 8 | — |
| 0·595 | 43 ·0 | 41 ·4 | S. *b* W. | 29 | 10 | N |
| 0·606 | 42 ·9 | 41 ·1 | S. *b* W. | 27 | 10 | N |
| 0·607 | 42 ·5 | 40 ·3 | S. | 30 | 10 | N |
| 0·611 | 41 ·5 | 39 ·6 | S. | 24 | 10 | N |
| 0·608 | 40 ·2 | 38 ·5 | S. | 29 | 9 | N |
| 0·605 | 40 ·8 | 38 ·6 | S. | 32 | 9 | K S, N |
| 0·614 | 40 ·8 | 38 ·4 | S. *b* E. | 27 | 8 | K S |
| 0·617 | 40 ·3 | 38 ·0 | S. *b* E. | 33 | 8 | K S, C |
| 0·625 | 40 ·3 | 38 ·1 | S. | 28 | 9 | K S |

Remarks.

Squally throughout the day.
March 22, 0 A. M.—Wind unsteady.
Raining, with little interruption, from March 21, 10 A. M. to March 22, 2 A. M.; amount = 0·235 inch.

Table XXXIV. (*continued*). Hourly Observations.

**Courtown.**

Lat. = 52° 39′. Long. = 6° 13′. Height = 34 feet.
Barometric Correction = + ·036.
Velocity of Wind expressed in feet per second.

| Day. | Hour. | Barom. | Therms. | | Wind. | |
|---|---|---|---|---|---|---|
| | | | Dry. | Wet. | Direction. | Force |
| Mar. 21, | 6 A. M. | 1·042 | 41°·2 | 41°·2 | S. S. W. | 13 |
| | 7 | 1·030 | 43 ·8 | 43 ·5 | S. | 14 |
| | 8 | 1·023 | 44 ·8 | 43 ·0 | S. | 17 |
| | 9 | 1·013 | 45 ·2 | 44 ·2 | S. | 22 |
| | 10 | 0·994 | 47 ·0 | 46 ·0 | S. | 35 |
| | 11 | 0·980 | 48 ·8 | 46 ·5 | S. S. W. | 35 |
| | 12 | 0·970 | 49 ·8 | 46 ·5 | S. S. W. | 43 |
| | 1 P. M. | 0·959 | 50 ·0 | 46 ·8 | S. S. W. | 43 |
| | 2 | 0·955 | 50 ·8 | 47 ·0 | S. W. | 43 |
| | 3 | 0·942 | 50 ·2 | 46 ·8 | S. W. | 58 |
| | 4 | 0·934 | 50 ·0 | 46 ·0 | S. W. | 43 |
| | 5 | 0·930 | 47 ·8 | 45 ·0 | S. W. | 38 |
| | 6 | 0·933 | 47 ·0 | 44 ·0 | S. W. | 35 |
| | 7 | 0·942? | 45 ·8 | 43 ·0 | S. W. | 31 |
| | 8 | 0·952 | 45 ·5 | 43 ·0 | S. W. | 29 |
| | 9 | 0·956 | 43 ·2 | 42 ·0 | S. W. | 29 |
| | 10 | 0·957 | 43 ·2 | 41 ·2 | S. W. | 17 |
| | 11 | 0·956 | 43 ·0 | 41 ·0 | S. W. | 17 |
| Mar. 22, | 0 | 0·956 | 42 ·0 | 40 ·0 | S. W. | 15 |
| | 1 A. M. | 0·943 | 41 ·2 | 39 ·0 | S. W. | 14 |
| | 2 | 0·936 | 41 ·0 | 40 ·0 | S. S. W. | 13 |
| | 3 | 0·925 | 41 ·0 | 40 ·0 | S. W. | 13 |
| | 4 | 0·913 | 40 ·0 | 39 ·0 | S. W. | 12 |
| | 5 | 0·902 | 38 ·2 | 38 ·0 | S. W. | 7 |
| | 6 | 0·894 | 38 ·0 | 37 ·0 | S. W. | 7 |

Remarks.

Mar. 21.—Intermittent sunshine; partially overcast, with cumulus.
3 P. M.—Squall, with drops of rain.
5 P. M.—Halo round sun.
Mar. 22, 2 A. M. & 3 A. M.—Halo round moon.

**Markree.**

Lat. = 54° 14′. Long. = 8° 28′. Height = 132 feet.
Barometric Correction = + 0·161.
Velocity of Wind expressed in feet per second.

| Barom | Therms. | | Wind. | | Cloud. | |
|---|---|---|---|---|---|---|
| | Dry. | Wet. | Direction. | Force. | Amt. | Form. |
| 0·782 | 41°·0 | 40°·3 | S. S. E. | 25 | 9 | N. |
| 0·776 | 41 ·7 | 41 ·0 | S. S. E. | 27 | 10 | N. |
| 0·758 | 43 ·6 | 42 ·6 | S. S. E. | 29 | 10 | N. |
| 0·738 | 45 ·2 | 43 ·7 | S. E. | 22 | 9 | N, K |
| 0·711 | 46 ·4 | 44 ·6 | S. E. | 32 | 10 | N, K, S |
| 0·691 | 47 ·5 | 45 ·3 | S. S. E. | 27 | 10 | K, N, S |
| 0·657 | 46 ·7 | 44 ·7 | S. S. E. | 26 | 10 | N, S, K S |
| 0·615 | 47 ·3 | 46 ·2 | S. S. E. | 25 | 10 | N |
| 0·560 | 45 ·1 | 44 ·9 | S. S. E. | 35 | 10 | N |
| 0·528 | 47 ·5 | 46 ·9 | S. | 29 | 10 | N |
| 0·528 | 48 ·7 | 47 ·1 | S. S. W. | 28 | 10 | N |
| 0·555 | 47 ·0 | 45 ·7 | S. W. | 19 | 10 | N |
| 0·563 | 46 ·0 | 45 ·1 | S. S. W. | 26 | 10 | N |
| 0·583 | 45 ·1 | 44 ·5 | S. S. W. | 15 | 10 | N |
| 0·597 | 44 ·3 | 43 ·4 | S. S. W. | 22 | 9 | N, S |
| 0·600 | 43 ·4 | 42 ·9 | S. | 20 | 3 | N |
| 0·613 | 43 ·8 | 43 ·3 | S. | 23 | 7 | N |
| 0·619 | 43 ·3 | 43 ·0 | S. | 16 | 9 | N, S |
| 0·617 | 42 ·9 | 42 ·3 | S. | 20 | 9 | N, K S |
| 0·635 | 43 ·4 | 43 ·0 | S. S. E. | 16 | 10 | N, K S |
| 0·637 | 42 ·9 | 42 ·4 | S. | 18 | 10 | N, K, S |
| 0·640 | 42 ·4 | 42 ·1 | S. | 16 | 7 | N, S |
| 0·642 | 42 ·0 | 41 ·7 | S. | 15 | 9 | N, S |
| 0·645 | 41 ·5 | 41 ·4 | S. | 14 | 9 | S, K S, N |
| 0·654 | 41 ·7 | 41 ·6 | S. | 14 | 8 | N |

Remarks.

Mar. 21, 6 A. M. to 12 P. M.—Moderate gale; at 2 P. M. strong gale.
Rain began at 0 30 P. M., and continued until 7 P. M.; amount = 0·102. Light rain at 10 and 11 P. M.
4 P. M.—Clouds very dense in W. and N. W.

Table XXXIV. (*continued*). Hourly Observations.

**Dunmore East.**

Lat. = 52° 8′. Long. = 6° 59′. Height = 66 feet.
Barometric Correction = + 0·091.
Force of Wind expressed in terms of scale (0 – 6).

| Day. | Hour. | Barom. | Therms. | | Wind. | |
|---|---|---|---|---|---|---|
| | | | Dry. | Wet. | Direction. | Force |
| Mar. 21, | 6 A. M. | 0·964 | 45°·0 | 43°·5 | S. | 3 |
| | 7 | 0·954 | 45 ·0 | 43 ·5 | S. S. W. | 4 |
| | 8 | 0·951 | 46 ·0 | 44 ·5 | S. S. W. | 3 |
| | 9 | 0·945 | 47 ·5 | 46 ·0 | S. S. W. | 3 |
| | 10 | 0·885 | 48 ·0 | 47 ·0 | S. S. W. | 4 |
| | 11 | 0·881 | 48 ·5 | 47 ·0 | S. S. W. | 4 |
| | 12 | 0·881 | 48 ·5 | 47 ·0 | S. S. W. | 4 |
| | 1 P. M. | 0·907 | 49 ·0 | 47 ·5 | S. S. W. | 4 |
| | 2 | 0·913 | 49 ·5 | 47 ·0 | S. S. W. | 4 |
| | 3 | 0·901 | 49 ·0 | 47 ·5 | S. S. W. | 5 |
| | 4 | 0·905 | 47 ·5 | 45 ·0 | W. S. W. | 5 |
| | 5 | 0·905 | 48 ·5 | 46 ·0 | S. W. | 5 |
| | 6 | 0·909 | 47 ·5 | 45 ·0 | W. S. W. | 5 |
| | 7 | 0·914 | 46 ·0 | 44 ·0 | W. S. W. | 5 |
| | 8 | 0·919 | 45 ·5 | 43 ·5 | W. S. W. | 3 |
| | 9 | 0·905 | 45 ·0 | 43 ·0 | W. S. W. | 4 |
| | 10 | 0·905 | 44 ·5 | 42 ·5 | S. W. | 3 |
| | 11 | 0·903 | 44 ·0 | 42 ·5 | S. W. | 3 |
| Mar. 22, | 0 | 0·882 | 45 ·0 | 43 ·0 | S. W. | 4 |
| | 1 A. M. | 0·883 | 45 ·0 | 43 ·0 | S. S. W. | 4 |
| | 2 | 0·881 | 45 ·0 | 43 ·0 | S. W. | 3 |
| | 3 | 0·855 | 44 ·5 | 42 ·5 | S. W. | 3 |
| | 4 | 0·830 | 43 ·5 | 41 ·5 | S. W. | 2 |
| | 5 | 0·811 | 43 ·0 | 41 ·5 | S. | 2 |
| | 6 | 0·811 | 43 ·0 | 41 ·5 | S. | — |

Remarks.

Mar. 21.—Squally throughout day, and for the most part clouded.
2 P. M.—Heavy shower.
Greatest force of wind from 3 P. M. to 5 P. M.; amounted to 8 lbs. on the square foot.

**Portrush.**

Lat. = 55° 13′. Long. = 6° 41′. Height = 29 feet.
Barometric Correction = + 0·082.
Velocity of Wind expressed in feet per second.

| Barom. | Therms. | | Wind. | | Cloud. | |
|---|---|---|---|---|---|---|
| | Dry. | Wet. | Direction. | Force. | Amt. | Form. |
| 1·011 | 40°·8 | 39°·9 | S. E. | 18 | 5 | N |
| 0·998 | 40 ·6 | 39 ·7 | S. E. | 18 | 7 | N |
| 0·988 | 42 ·8 | 41 ·8 | S. E. | 25 | 6 | N |
| 0·971 | 45 ·4 | 43 ·9 | S. E. | 30 | 7 | N |
| 0·945 | 47 ·4 | 45 ·4 | S. E. | 35 | 8 | N |
| 0·923 | 49 ·5 | 46 ·9 | S. E. | 35 | 6 | N |
| 0·901 | 49 ·1 | 46 ·5 | S. E. | 35 | 6 | N |
| 0·878 | 48 ·6 | 46 ·1 | S. E. | 43 | 6 | N |
| 0·844 | 49 ·9 | 47 ·5 | S. E. | 41 | 6 | N |
| 0·819 | 48 ·5 | 45 ·7 | S. E. | 35 | 7 | N |
| 0·793 | 48 ·4 | 46 ·0 | S. E. | 39 | 8 | N |
| 0·765 | 47 ·9 | 45 ·6 | S. E. | 35 | 9 | N |
| 0·765 | 46 ·6 | 44 ·6 | S. E. | 35 | 9 | N |
| 0·744 | 45 ·7 | 43 ·8 | S. | 37 | 9 | N |
| 0·727 | 45 ·5 | 43 ·7 | S. | 39 | 9 | N |
| 0·737 | 45 ·3 | 43 ·7 | S. | 36 | 9 | N |
| 0·744 | 45 ·1 | 43 ·6 | S. | 48 | 8 | N |
| 0·752 | 44 ·9 | 43 ·3 | S. | 37 | 7 | N |
| 0·760 | 44 ·4 | 42 ·8 | S. | 39 | 9 | N |
| 0·764 | 44 ·0 | 42 ·4 | S. | 37 | 9 | N |
| 0·770 | 43 ·6 | 42 ·0 | S. | 36 | 10 | — |
| 0·728 | 43 ·0 | 41 ·0 | S. | 29 | 10 | — |
| 0·764 | 42 ·1 | 40 ·6 | S. | 39 | 9 | N |
| 0·776 | 41 ·9 | 40 ·4 | S. | 35 | 9 | N |
| 0·780 | 41 ·9 | 40 ·5 | S. | 35 | 9 | N |

Remarks.

Faint sunshine until 4 P. M.; afterwards overcast and misty.
Noon.—Light showers.
6 P. M.—Continued rain.
9 P. M.—Showers.

TABLE XXXIV. (*continued*). HOURLY OBSERVATIONS.

**CAHIRCIVEEN.**

Lat. = 51° 56′. Long. = 10° 13′. Height = 52 feet.
Barometric Correction = + 0·081.
Force of Wind expressed in terms of scale (0 – 6).

| Day. | Hour. | Barom. | Therms. | | Wind. | |
|---|---|---|---|---|---|---|
| | | | Dry. | Wet. | Direction. | Force |
| June 21, | 6 A.M. | 1·757 | 55°·6 | .... | S. W. | 1 |
| | 7 | 1·743 | 58 ·2 | | | |
| | 8 | 1·734 | 59 ·0 | | | |
| | 9 | 1·734 | 59 ·6 | .... | S. W. | 1 |
| | 10 | 1·724 | 61 ·0 | | | |
| | 11 | 1·721 | 60 ·6 | | | |
| | 12 | 1·713 | 61 ·0 | .... | W. | 2 |
| | 1 P.M. | 1·713 | 62 ·4 | | | |
| | 2 | 1·719 | 58 ·6 | | | |
| | 3 | 1·724 | 57 ·4 | .... | N. W. | 3 |
| | 4 | 1·726 | 56 ·4 | | | |
| | 5 | 1·730 | 56 ·8 | | | |
| | 6 | 1·751 | 56 ·8 | .... | N. N. W. | 2 |
| | 7 | 1·762 | 56 ·2 | | | |
| | 8 | 1·773 | 55 ·6 | | | |
| | 9 | 1·792 | 54 ·8 | .... | N. W. | 2 |
| | 10 | 1·805 | 54 ·4 | | | |
| | 11 | 1·808 | 54 ·2 | | | |
| June 22, | 0 | 1·815 | 54 ·0 | | | |
| | 1 A.M. | 1·835 | 53 ·8 | .... | W. N. W. | 2 |
| | 2 | 1·851 | 53 ·4 | .... | N. W. | 2 |
| | 3 | 1·866 | 53 ·4 | .... | N. N. W. | |
| | 4 | 1·884 | 53 ·6 | | | |
| | 5 | 1·911 | 53 ·4 | | | |
| | 6 | 1·937 | 53 ·4 | .... | N. N. W. | 2 |

REMARKS.

The observations of temperature were taken, by mistake, with one of the registering thermometers.
June 21, 22.—Clouded throughout day.
June 21, 2 P.M.—Drizzling rain.
June 22, 0 A.M.—Showers; 2 A.M. ditto.

**ARMAGH.**

Lat. = 54° 21′. Long. = 6° 39′. Height = 211 feet.
Barometric Correction = + 0·273.
Velocity of Wind expressed in feet per second.

| Barom. | Therms. | | Wind. | | Cloud. | |
|---|---|---|---|---|---|---|
| | Dry. | Wet. | Direction. | Vel. | Amt. | Form. |
| 1·584 | 57°·2 | 54°·6 | S. S. W. | 7 | 10 | S |
| 1·580 | 58 ·7 | 55 ·3 | S.W. *b* S. | 13 | 5 | S, C |
| 1·577 | 60 ·4 | 56 ·8 | S.W. *b* S. | 18 | 5 | S, C, K |
| 1·549 | 61 ·8 | 57 ·3 | S.W. *b* S. | 17 | 10 | K S |
| 1·530 | 63 ·3 | 58 ·3 | S.W. *b* S. | 12 | 10 | S |
| 1·517 | 65 ·1 | 59 ·3 | S.W. *b* S. | 14 | 10 | K S |
| 1·505 | 65 ·7 | 59 ·0 | S.W. *b* S. | 21 | 10 | K S |
| 1·498 | 64 ·9 | 60 ·0 | S.W. *b* S. | 17 | 10 | K |
| 1·480 | 62 ·9 | 61 ·1 | S.W. *b* S. | 18 | 10 | K S, N |
| 1·467 | 62 ·2 | 58 ·6 | S.W. *b* W. | 16 | 10 | K S, S |
| 1·455 | 61 ·3 | 58 ·3 | S. W. | 14 | 10 | K S, S |
| 1·469 | 55 ·9 | 53 ·9 | W. N.W. | 10 | 10 | K S, S |
| 1·476 | 53 ·7 | 51 ·1 | W *b* N. | 8 | 10 | N, K S |
| 1·474 | 53 ·2 | 51 ·7 | W. | 7 | 10 | C K |
| 1·484 | 53 ·9 | 51 ·6 | W. | 8 | 3 | K |
| 1·495 | 50 ·6 | 48 ·6 | W. *b* N. | 6 | 1 | K S |
| 1·498 | 50 ·1 | 48 ·1 | W. | 9 | 1 | K S |
| 1·509 | 50 ·1 | 48 ·2 | W. | 6 | 7 | K |
| 1·524 | 50 ·8 | 48 ·9 | W. *b* S. | 10 | 7 | K |
| 1·522 | 49 ·0 | 47 ·6 | W. *b* N. | 5 | 4 | C K |
| 1·529 | 49 ·0 | 47 ·3 | W | 6 | 7 | S, C K |
| 1·533 | 49 ·4 | 47 ·3 | W. | 7 | 7 | C K |
| 1·548 | 51 ·2 | 48 ·8 | W. | 9 | 9 | K, N |
| 1·583 | 50 ·5 | 48 ·9 | W. *b* N. | 8 | 10 | K |
| 1·604 | 51 ·9 | 49 ·0 | N. W. | 17 | 9 | K |

REMARKS.

June 21.—Rain from 2 P.M. to 6 P.M.; amount = 0·076.
June 22, 4 A.M., 6 A.M.—Drizzling rain.

TABLE XXXIV. (*continued*). HOURLY OBSERVATIONS

**COURTOWN.**

Lat. = 52° 39′. Long. = 6° 13′. Height = 34 feet.
Barometric Correction = + 0·036.
Velocity of Wind expressed in feet per second.

| Day. | Hour. | Barom. | Therms. | | Wind. | |
|---|---|---|---|---|---|---|
| | | | Dry. | Wet. | Direction. | Vel. |
| June 21, | 6 A. M. | 1·861 | 59°·0 | 58°·0 | — | 0 |
| | 7 | 1·851 | 60 ·0 | 58 ·0 | S. E. | 5 |
| | 8 | 1·839 | 61 ·2 | 59 ·2 | S. E. | 8 |
| | 9 | 1·804 | 63 ·8 | 61 ·2 | S. E. | 12 |
| | 10 | 1·794 | 64 ·2 | 61 ·2 | S. E. | 11 |
| | 11 | 1·778 | 64 ·8 | 61 ·0 | S. E. | 12 |
| | 12 | 1·767 | 67 ·0 | 63 ·0 | S. E. | 9 |
| | 1 P. M. | 1·738 | 67 ·2 | 63 ·0 | S. E. | 11 |
| | 2 | 1·718 | 63 ·8 | 60 ·0 | — | 0 |
| | 3 | 1·698 | 63 ·0 | 60 ·5 | — | 0 |
| | 4 | 1·680 | 65 ·5 | 63 ·5 | W. S. W. | 14 |
| | 5 | 1·668 | 64 ·0 | 60 ·5 | W. N. W. | 17 |
| | 6 | 1·668 | 63 ·2 | 60 ·0 | W. N. W. | 17 |
| | 7 | 1·676 | 61 ·2 | 57 ·0 | N. W. | 14 |
| | 8 | 1·695 | 60 ·0 | 57 ·0 | N. W. | 29 |
| | 9 | 1·726 | 56 ·5 | 53 ·2 | N. W. | 19 |
| | 10 | 1·740 | 56 ·0 | 53 ·0 | N. W. | — |
| | 11 | 1·754 | 54 ·8 | 50 ·2 | N. W. | — |
| June 22, | 0 | 1·773 | 52 ·2 | 49 ·2 | N. W. | — |
| | 1 A. M. | 1·786 | 51 ·8 | 49 ·0 | — | 0 |
| | 2 | 1·791 | 51 ·2 | 49 ·0 | — | 0 |
| | 3 | 1·805 | 50 ·2 | 48 ·2 | W. | 5 |
| | 4 | 1·825 | 50 ·0 | 48 ·0 | W. S. W. | 5 |
| | 5 | 1·846 | 52 ·8 | 51 ·2 | S. | 6 |
| | 6 | 1·857 | 53 ·0 | 51 ·0 | W. | 7 |

REMARKS.

June 21, 1 P.M.—Overcast. Thunder, followed by heavy drops of rain; air sultry.

**MARKREE.**

Lat. = 54° 14′. Long. = 8° 28′. Height = 132 feet.
Barometric Correction = + 0·161.
Velocity of Wind expressed in feet per second.

| Barom. | Therms. | | Wind. | | Cloud. | |
|---|---|---|---|---|---|---|
| | Dry. | Wet. | Direction. | Vel. | Amt. | Form. |
| 1·668 | 56°·1 | 54°·9 | S. S. E. | 9 | 10 | S, K S |
| 1·652 | 57 ·0 | 55 ·4 | S. S. E. | 9 | 10 | N, S |
| 1·650 | 58 ·8 | 56 ·1 | S. S. W. | 8 | 10 | N, S |
| 1·623 | 59 ·5 | 56 ·9 | S. S. W. | 13 | 10 | N, S |
| 1·607 | 61 ·0 | 57 ·2 | S. S. W. | 9 | 10 | S, K S |
| 1·607 | 62 ·6 | 58 ·2 | S. S. W. | 16 | 10 | N, K |
| 1·599 | 63 ·4 | 58 ·6 | S. S. W. | 12 | 10 | N |
| 1·593 | 57 ·5 | 55 ·0 | N. W. | 12 | 10 | N, S |
| 1·611 | 52 ·8 | 51 ·9 | N. N. W. | 12 | 10 | N |
| 1·618 | 53 ·2 | 53 ·6 | W. N. W. | 2 | 10 | N |
| 1·600 | 54 ·1 | 53 ·4 | N. W. | 3 | 10 | N, K, S |
| 1·586 | 57 ·0 | 53 ·1 | N. W. | 14 | 4 | N, K |
| 1·596 | 55 ·0 | 52 ·1 | W. N. W. | 11 | 9 | N, K |
| 1·612 | 55 ·2 | 51 ·9 | W. N. W | 13 | 3 | N, K |
| 1·624 | 52 ·9 | 50 ·0 | W. | 10 | 10 | K, N |
| 1·631 | 51 ·1 | 49 ·7 | W. | 14 | 4 | K, K S |
| 1·645 | 50 ·6 | 50 ·0 | W. | 9 | 10 | N, K |
| 1·645 | 49 ·4 | 49 ·0 | W. N. W. | 13 | 7 | N, K S |
| 1·649 | 50 ·2 | 49 ·8 | W. N. W. | 14 | 8 | N, K |
| 1·663 | 49 ·9 | 49 ·9 | W. N. W. | 11 | 10 | N |
| 1·680 | 50 ·4 | 50 ·3 | W. | 14 | 10 | N |
| 1·693 | 49 ·1 | 49 ·4 | N. N. W. | 10 | 10 | N |
| 1·717 | 48 ·7 | 47 ·7 | N. N. W. | 14 | 4 | C S, C K |
| 1·641 | 51 ·9 | 50 ·1 | N. N. W. | 12 | 9 | N, C S |
| 1·779 | 51 ·7 | 48 ·8 | N. N. W. | 19 | 3 | K, N |

REMARKS.

June 21, 6 A. M.—9 A. M.—Light rain.
3 P. M.—Heavy rain; amount = ·060.
10 P. M.—Heavy shower.
June 22, 10 A. M.—Moderate rain.

TABLE XXXIV. (*continued*). HOURLY OBSERVATIONS.

**DUNMORE EAST.**

Lat. = 52° 8′. Long. = 6° 59′. Height = 66 feet.
Barometric Correction = + 0·091.
Force of Wind expressed in terms of scale (0 – 6).

| Date. | Hour. | Barom. | Therms. | | Wind. | |
|---|---|---|---|---|---|---|
| | | | Dry. | Wet. | Direction. | Force |
| June 21, | 6 A. M. | 1·784 | 60°·5 | 57°·0 | S. S. W. | 1 |
| | 7 | 1·774 | 62 ·0 | 58 ·5 | S. S. W. | 2 |
| | 8 | 1·761 | 63 ·0 | 60 ·0 | S. S. W. | 2 |
| | 9 | 1·737 | 65 ·0 | 60 ·5 | S. S. W. | 2 |
| | 10 | 1·727 | 66 ·0 | 62 ·5 | S. | 2 |
| | 11 | 1·716 | 68 ·0 | 64 ·5 | S. | 2 |
| | 12 | 1·688 | 69 ·0 | 64 ·5 | S. | 2 |
| | 1 P. M. | 1·676 | 69 ·0 | 63 ·0 | S. | 2 |
| | 2 | 1·661 | 67 ·0 | 62 ·0 | S. S. W. | 2 |
| | 3 | 1·647 | 66 ·0 | 60 ·5 | S. S. W. | 2 |
| | 4 | 1·632 | 65 ·5 | 60 ·5 | W. S. W. | 1 |
| | 5 | 1·632 | 63 ·0 | 58 ·0 | W. N. W. | 1 |
| | 6 | 1·644 | 62 ·0 | 58 ·0 | N. W. | 2 |
| | 7 | 1·649 | 61 ·0 | 57 ·0 | N. W. | 2 |
| | 8 | 1·658 | 58 ·5 | 54 ·0 | N. W. | 2 |
| | 9 | 1·667 | 56 ·5 | 52 ·0 | N. W. | 2 |
| | 10 | 1·714 | 54 ·5 | 50 ·5 | N. W. | 2 |
| | 11 | 1·739 | 53 ·5 | 49 ·5 | N. W. | 1 |
| June 22, | 0 | 1·749 | 52 ·0 | 49 ·0 | N. W. | 1 |
| | 1 A. M. | 1·813 | 50 ·5 | 47 ·5 | N. W. | 1 |
| | 2 | 1·808 | 48 ·0 | 46 ·0 | W. N. W. | 1 |
| | 3 | 1·811 | 48 ·5 | 46 ·0 | W. N. W. | 1 |
| | 4 | 1·813 | 48 ·0 | 46 ·0 | W. N. W. | 1 |
| | 5 | 1·813 | 51 ·0 | 49 ·0 | W. N. W. | 2 |
| | 6 | 1·835 | 54 ·5 | 52 ·0 | W. N. W. | 2 |

REMARKS.

June 21.—Cloudy until 10 P. M. Raining from 4 P. M. to 6 P. M.
Clear from June 21, 11 P. M. to June 22, 5 A. M.

**PORTRUSH.**

Lat. = 55° 13′. Long. = 6° 41′. Height = 29 feet.
Barometric Correction = + 0·082.
Velocity of Wind expressed in feet per second.

| Barom. | Therms. | | Wind. | | Cloud. | |
|---|---|---|---|---|---|---|
| | Dry. | Wet. | Direction. | Vel. | Amt. | Form. |
| 1·761 | 57°·0 | 56°·3 | S. | 15 | 10 | — |
| 1·744 | 57 ·5 | 56 ·6 | S. | 17 | 10 | — |
| 1·732 | 58 ·4 | 57 ·3 | S. | 17 | 10 | — |
| 1·718 | 58 ·5 | 57 ·4 | S· | 25 | 10 | — |
| 1·705 | 58 ·6 | 56 ·9 | S. | 26 | 10 | — |
| 1·689 | 59 ·6 | 58 ·2 | S | 28 | 10 | — |
| 1·673 | 60 ·4 | 57 ·7 | S. | 31 | 10 | — |
| 1·667 | 61 ·0 | 58 ·9 | S. | 35 | 10 | — |
| 1.655 | 60 ·4 | 57 ·6 | S. W. | 35 | 10 | — |
| 1·642 | 60 ·4 | 57 ·1 | S. W. | 35 | 10 | — |
| 1·651 | 54 ·9 | 53 ·2 | N. W. | 36 | 10 | — |
| 1·652 | 52 ·9 | 51 ·5 | W. | 36 | 10 | — |
| 1·654 | 53 ·3 | 51 ·0 | W. | 23 | 9 | N |
| 1·655 | 54 ·4 | 52 ·3 | W. | 17 | 8 | N |
| 1·659 | 54 ·2 | 51 ·8 | W. | 34 | 4 | N |
| 1·654 | 53 ·1 | 51 ·0 | W. | 39 | 4 | N |
| 1·665 | 52 ·5 | 50 ·8 | W. | 27 | 3 | N |
| 1·673 | 52 ·3 | 51 ·3 | W. | 36 | 10 | — |
| 1·682 | 52 ·2 | 50 ·7 | W. | 35 | 4 | N |
| 1·674 | 52 ·3 | 50 ·8 | W. | 37 | 9 | N |
| 1·685 | 52 ·5 | 50 ·8 | W. | 39 | 5 | N |
| 1·693 | 52 ·0 | 50 ·9 | N. W. | 41 | 10 | — |
| 1·715 | 51 ·9 | 50 ·3 | N. W. | 48 | 8 | N |
| 1·748 | 51 ·6 | 48 ·9 | N. W. | 48 | 9 | N |
| 1·760 | 51 ·6 | 48 ·4 | N. W. | 48 | 9 | N |

REMARKS.

June 21.—Overcast until 6 P. M. Light rain until 1 P. M.
June 22, 3 A. M. to 6 A. M.—Showers with intermittent sunshine.